JOURNAL

OF THE

Indian Medical Association

VOLUME XXIII
NUMBER 1

CALCUTTA
OCTOBER 1953

Indian Medical Association
Central Office,
"Hanging Bridge", Daryaganj,
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TABLE OF CONTENTS

ORIGINAL ARTICLES:

1. Stu[illegible] of Iron Metabolism in Anaemias in Pregnancy: Iron Binding Capacity and Iron Saturation of Plasma
—Chunilal Mukherjee &

CASE NOTES:

1. North American Blastomycosis
—B. B. Mukherjee 22
2. Primary Systemic Amyloidosis
—B. P. Tribedi & A. R. Roy ... 24

ORIALS:

Eosinophils 27
Our New Year 28
Dr. T. S. Tirumurti 29

RENT MEDICAL LITERATURE 30

RENT TOPIC 31

ES AND NEWS 39

RESPONDENCE 39

EWS 40

LEMENT i

VY

ES

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TABLE OF CONTENTS

ORIGINAL ARTICLES :

1. Study of Iron Metabolism in Anaemias in Pregnancy : Iron Binding Capacity and Iron Saturation of Plasma —Chunilal Mukherjee & Saroj Kumar Mukherjee 1
2. The Role of Resection in Pulmonary Tuberculosis—T. Thomas, Reeve H. Betts & N. Gopinath 10
3. Reduction of Muscular Performance During Menstruation—(Mrs.) S. Parvathi Debi & D. V. S. Reddy 13
4. Streptococcal Enzymes in combination with Recent Antibiotics in Chronic Otitis Media—Dwarka Nath Mukerjea 15

PRACTITIONERS' CORNER :

1. The Diagnosis of Sarcoidosis —Kshetra Sadhan Banerjee ... 21

CASE NOTES :

1. North American Blastomycosis —B. B. Mukherjee 22
2. Primary Systemic Amyloidosis —B. P. Tribedi & A. R. Roy ... 24

EDITORIALS :

1. Eosinophils 27
2. Our New Year 28
3. Dr. T. S. Tirumurti 29

CURRENT MEDICAL LITERATURE 30

CURRENT TOPIC 31

NOTES AND NEWS 39

CORRESPONDENCE 39

REVIEWS 40

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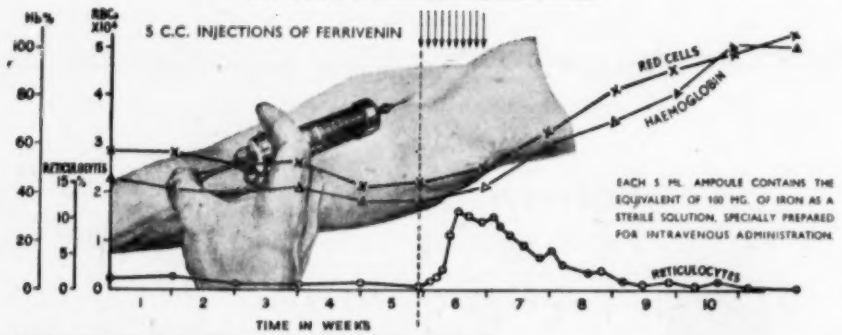

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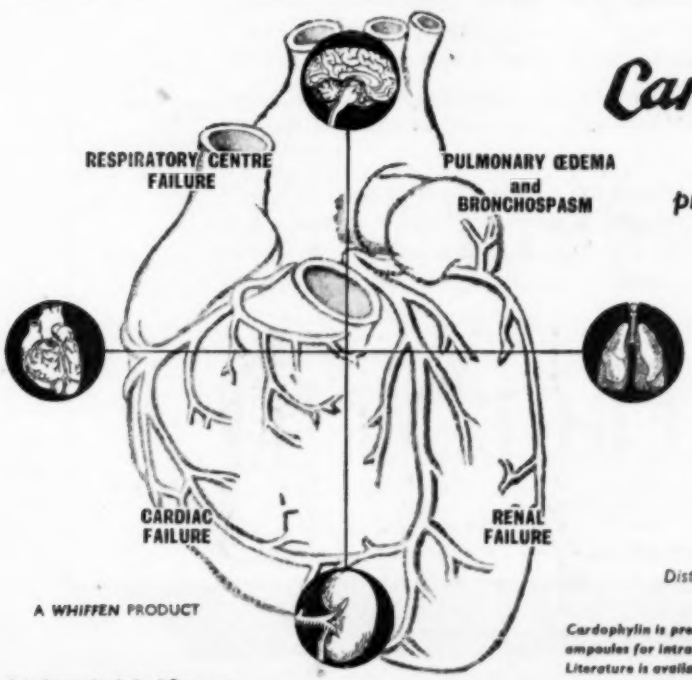
INDEX TO ADVERTISERS

	Page
Abco's Pharmaceutical Works (India) Ltd.	li
Allen & Hanburys Ltd.	iv,xliv
Alliance Trading Corporation	l
Alembic Chemical Works Co., Ltd.	xviii
Alkaloid Research Laboratories Ltd.	lii
Amalgamated Chemicals & Dyestuffs Co. Ltd.	xxix
Ames Co., Inc.	ix
Angier Chemical Co. Ltd.	x
Antiseptic	xxxviii
Bathgate & Co., Ltd.	li
Bayer Products Ltd.	xiii
Bengal Chemical & Pharmaceutical Works Ltd. Front Cover,	xxxv
Bengal Immunity Co., Ltd.	xxix
Benger Laboratories Ltd.	ii,iii
Boots Pure Drug Co. (India) Ltd.	xxvi
Brahmachari Research Institute	xxxviii
Burroughs Welcome & Co. (India) Ltd.	xxi
Calcutta Chemical Co., Ltd.	xl
Calcutta Polyclinic Ltd.	li
Capco Ltd.	vi,
Chas, Pfizer & Co. Inc.,	xlix
Chowgule & Co. (Hind) Ltd.	xli
Cilag-Hind Limited	xxxiv
Cipla Ltd.	xxxvi
Cow & Gate	xxxi
Crookes Laboratories Ltd.	xlv
Eastern Drug Company Limited	viii
East Asiatic Co. (I) Ltd.	xx
East India Pharmaceutical Works Ltd	xxiv
Franco-Indian United Laboratories	xi
G. D. A. Chemicals Ltd.	xiv
General Electric Co. of India Ltd.	xxviii
Goyals Limited	l
Glaxo Laboratories (India) Ltd	xxxvii
Gluconate Ltd.	xlii
Hind Chemicals Ltd.	xlvi
Horlicks Ltd.	xiv
I. M. S. Laboratory Ltd.	xxii
Imperial Chemical Industries (India) Ltd.	2nd Cover
Indian Health Institute & Laboratory Ltd.	xxxv
J & A. Churchill Ltd.	v
John Wyeth & Brother Ltd.	xxiii
Juggat Singh's Son & Bro.	lii
Lederle Laboratories (India) Ltd.	i,xxx,xxxii
Mac Laboratories Ltd.	3rd Cover
Mansukhlal Tribhovandas & Co.	li
May & Baker Ltd.	xliii
Merck (North America) Inc	xlvii
M. G. Shahani & Co. Ltd.	xii
Mysore Industrial & Testing Lab. Ltd.	xii
Navaratna Pharmaceutical Laboratories	xii
Nestle's Products (India) Ltd.	xvi
Neo-Pharma Limited	vii
Oriental Research & Chemical Lab. Ltd.	xlviii
Oriental Pharmaceutical Industries Ltd.	l
Parle's Products	xvii
Pasteur Laboratories Ltd.	l
Pharmed Ltd. (Menley & Jones, Ltd.)	xxvii
Pharmed Ltd. (Smith Kline & French International Co.)	xxv
Philips Electrical Co. (India) Ltd.	xxxix
Ranbaxy & Co., Ltd.	Back Cover
Raptakos, Brett & Co., Ltd.	x
Sarabhai Chemicals	xxxiii
Scientific Publication Concern	li
Smith, Stanistreet & Co., Ltd.	xlviii
Standard Drug & Chemical Co.	xxxi
Union Drug Co., Ltd.	xlii
Volkart Brothers	xv
W. B. Saunders Co., Ltd.	v
W. T. Suren & Co. Ltd.	xix



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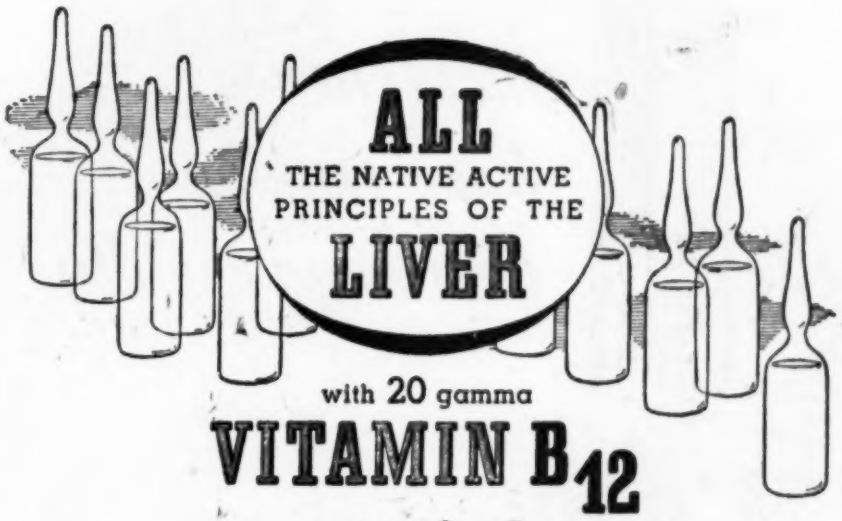

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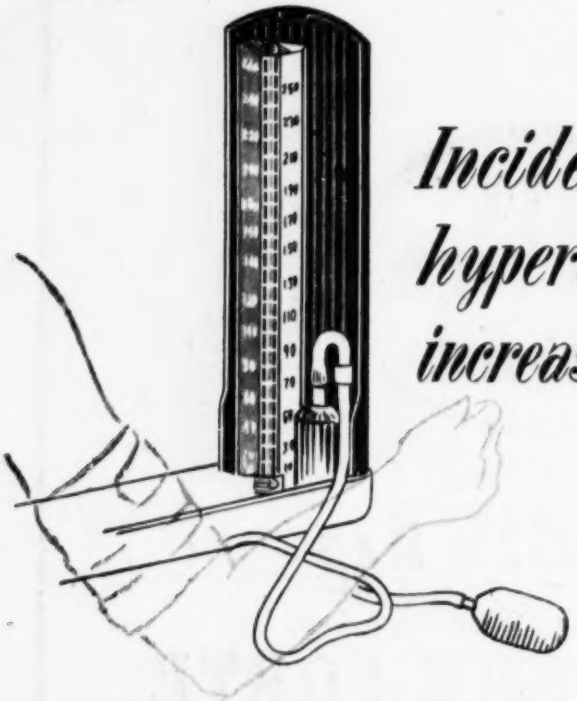

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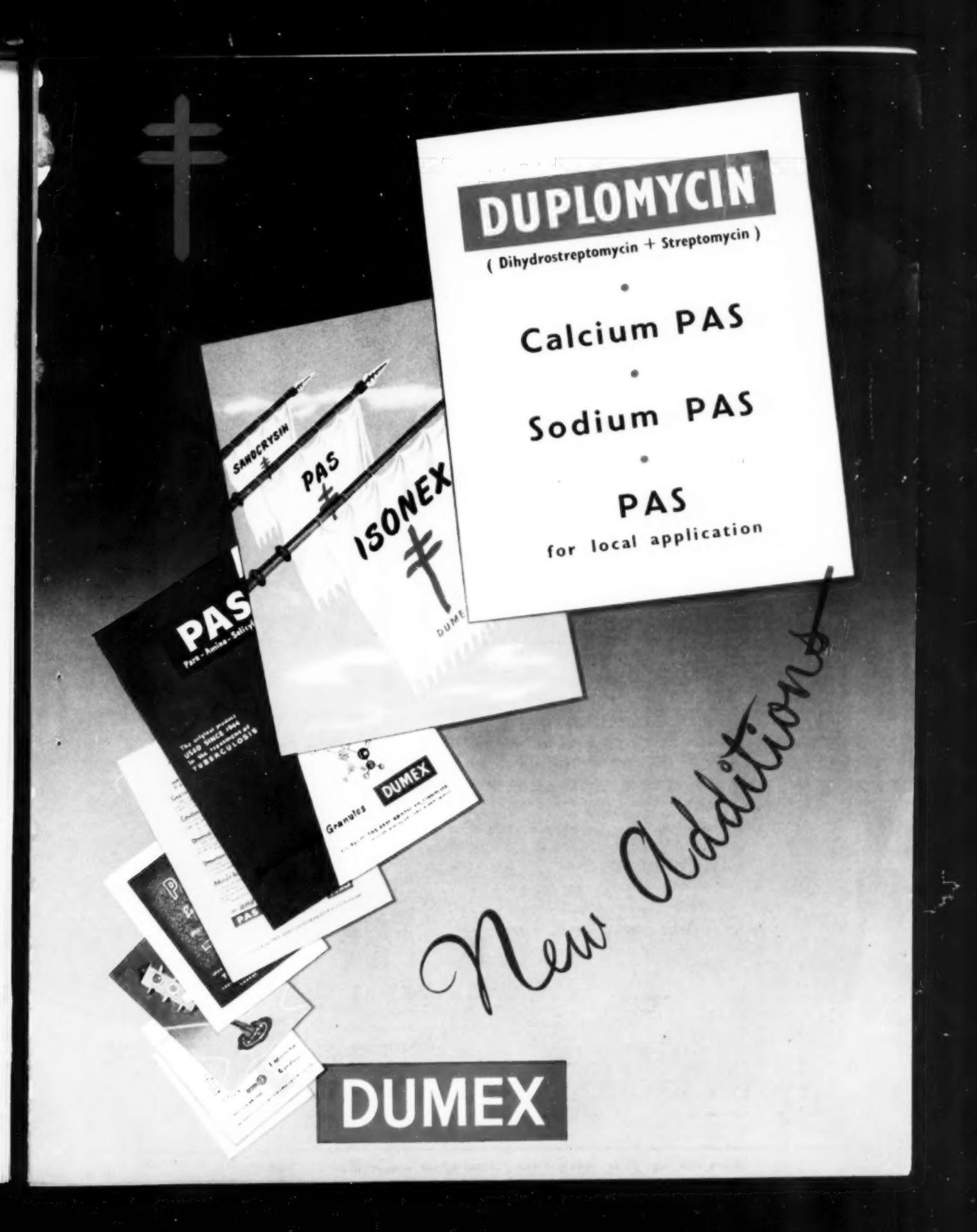
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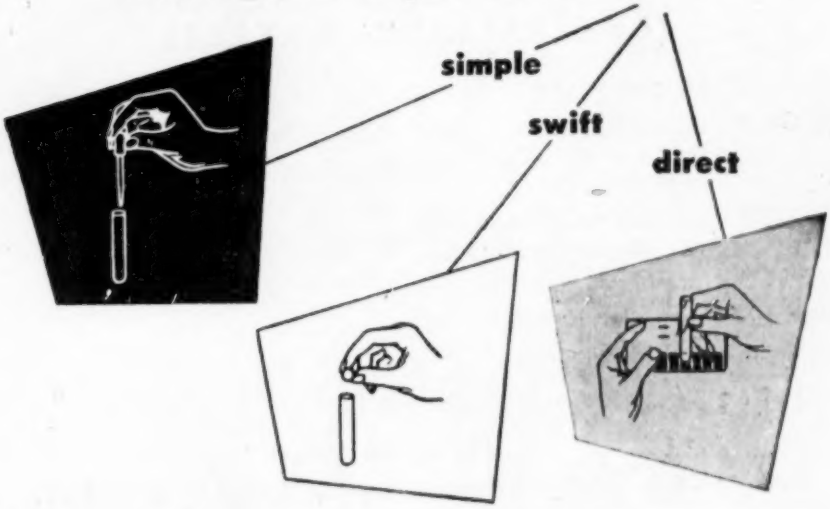

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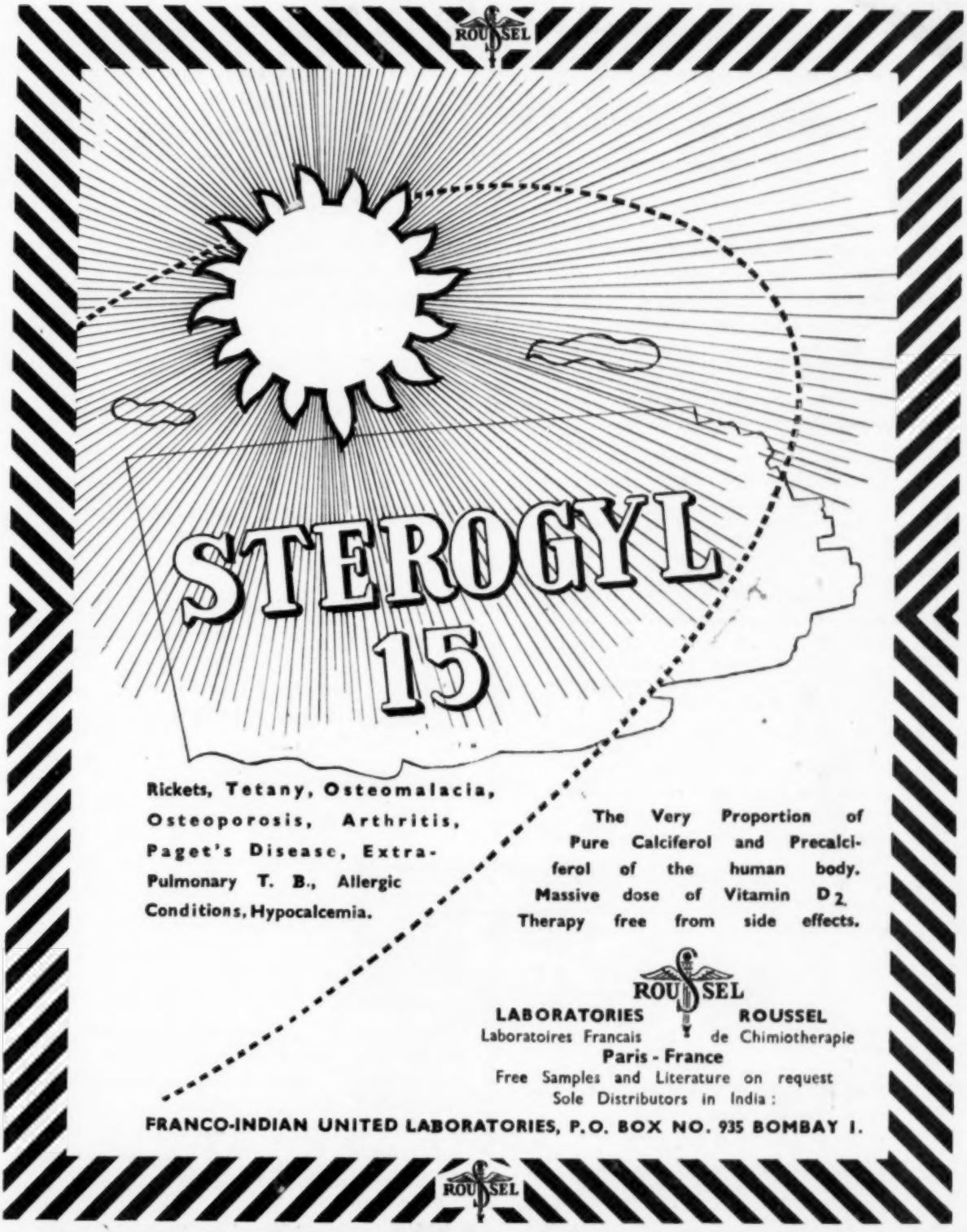
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British Medical Journal. 1, 24(1952)

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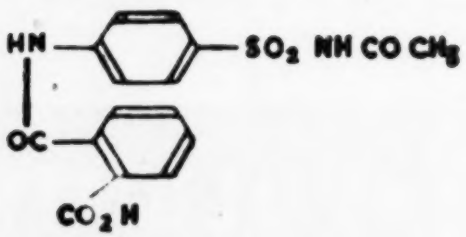

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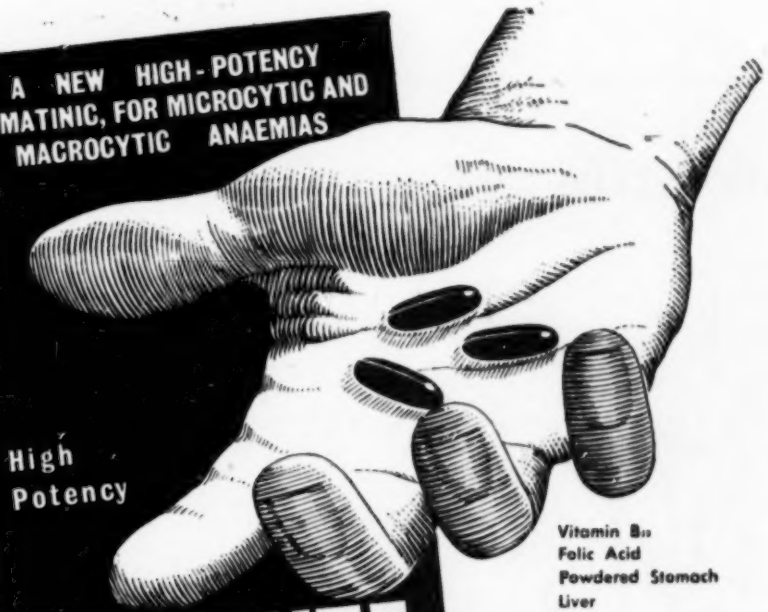

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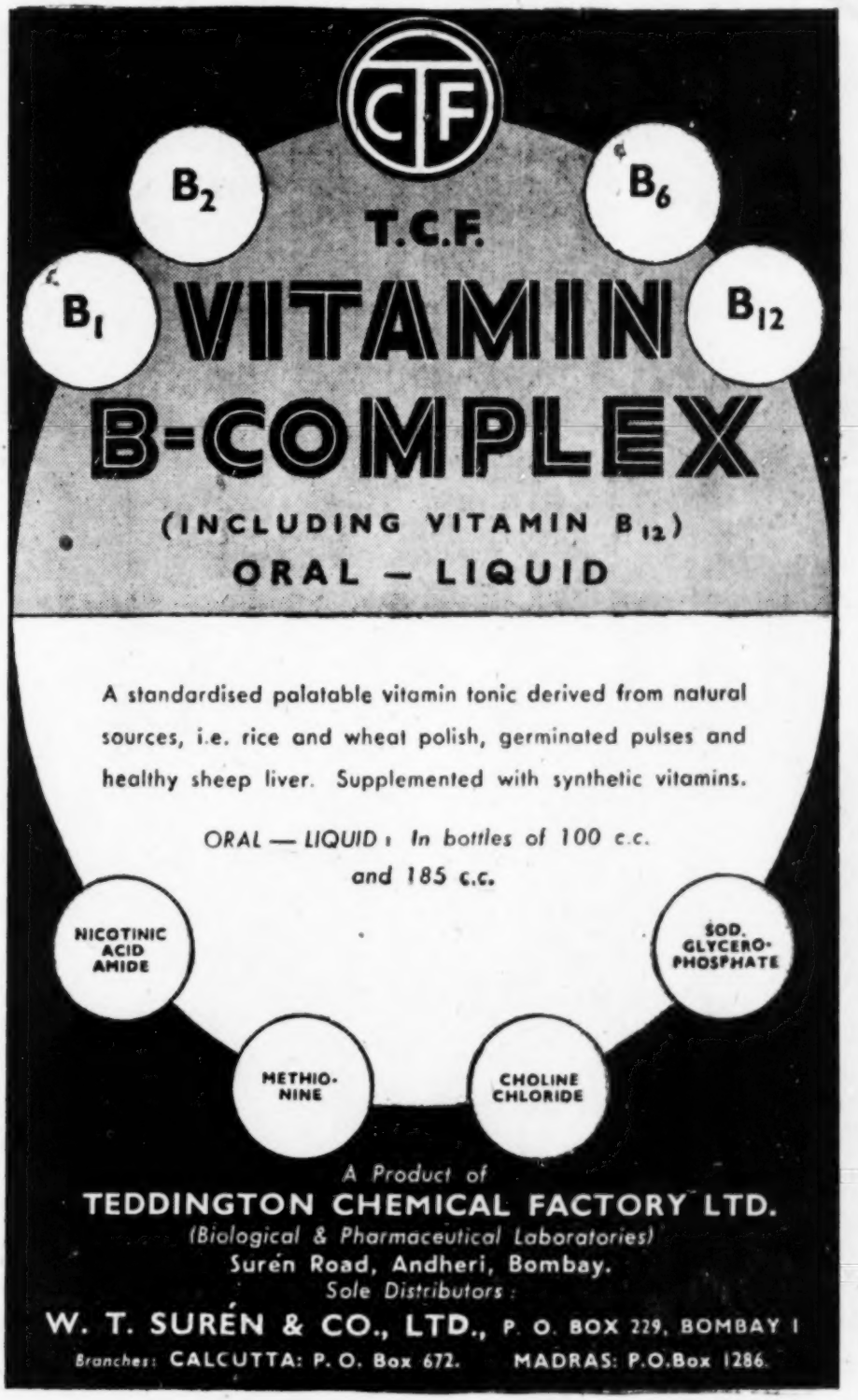
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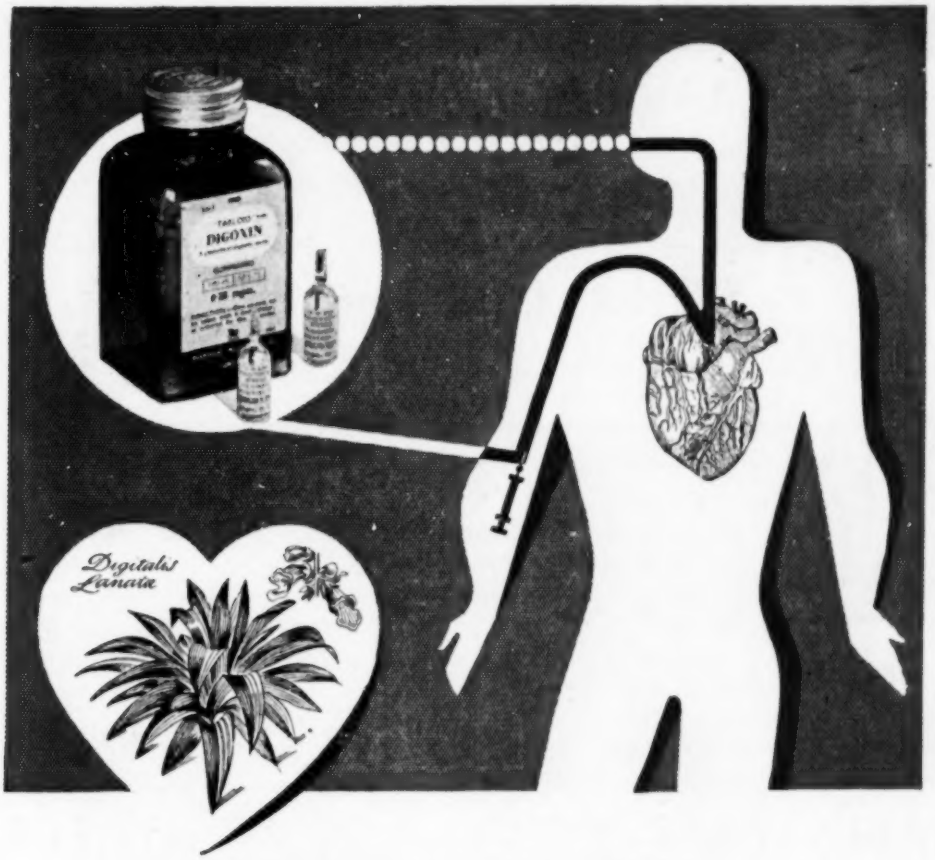

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Journal of the Indian Medical Association

VOL. XXIII, No. 1 CALCUTTA OCTOBER, 1953

ORIGINAL ARTICLES

STUDIES IN IRON METABOLISM IN ANAEMIAS IN PREGNANCY

2. Iron Binding Capacity and Iron Saturation of Plasma

CHUNILAL MUKHERJEE, PH.D., M.B., M.O.(CAL.), M.R.C.O.G.(LOND.),
AND
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Eden Hospital for Women, Calcutta

In recent years much has been known about the manner of iron absorption, but the processes involved in the utilisation of iron are yet not clearly understood. In a normal man with about 5000 mg. of body iron probably less than 1 mg. of iron is assimilated from the diet per day (Finch *et al*, 1950a). Even in presence of severe iron deficiency it is difficult for an individual to absorb more than 5 mg. of iron from a normal diet (Finch *et al* 1950b). The absorbed iron in the form of a crystallisable iron-protein complex, ferritin, is liberated on reaching the blood stream and taken up by the iron-carrying protein. Valquist (1941) showed by electrophoresis of plasma proteins that, the iron in the serum remains bound to both albumin and globulin, but α and β globulin serve as the principal carrier. Subsequent work has shown that the iron carrying protein resides almost completely in the β_1-globulin fraction (Schade and Caroline, 1946). Cohn and co-workers (1946) have isolated this fraction (β globulin, iv-4-8) of iron binding protein.

Cartwright and Wintrobe (1949) quoting a personal communication from Cohn states that this iron carrying protein fraction constitutes 3 per cent of plasma proteins. Combined with the iron carrying protein this element is transferred to various tissues to meet the metabolic needs. Any surplus iron carried in this way is deposited chiefly in the liver, which acts as an important store-house of this element. Thus, this organ serves the important function of regulating the serum iron level.

Transport of iron in the body for the purpose of both storage and metabolism takes place through the intermediary of the iron carrying protein. This carriage is by means of adsorption (Klopper, 1951). Schade and Caroline (1946) have observed that 1 mg. of this protein carried about 0·44 μg. Fe++ The iron binding capacity of the serum, therefore, indicates the amount of Cohn's β_1 globulin fraction available for the transport of iron. Under normal conditions this iron binding capacity is never completely exhausted, the proportion to which it has been taken up being called iron-saturation of the serum.

No study of iron metabolism is adequate until the nature of the iron binding capacity, and iron saturation of the serum has been determined. It is owing to this, that in the study of the iron metabolism in anaemia in pregnancy in India, the present investigation was undertaken.

MATERIALS AND METHODS

The method employed for determining the unsaturated iron binding capacity of the plasma was that of Schade and Caroline (1946). A photo-electric colorimeter with 540 μ green-filter was used. The method of estimation of serum iron has already been described (Mukherjee and Mukherji, 1953). The total iron binding capacity was determined by the summation of the above two data. Iron saturation was determined by finding the fraction which the serum iron constitutes of the total iron binding capacity. This was expressed in percentage.

As there are no available normal data for Indian women on the subject, a study of the iron binding capacity and iron saturation in 50 normal non-pregnant women was conducted before the investigation in pregnancy and anaemias was undertaken. These 50 cases comprised of 14 nurses, 2 medical students and 34 patients admitted for investigation of minor gynaecological complaints. They all had normal haematological findings. Data from these patients provided the normal control.

The study in normal pregnancy consisted of 70 cases. Of these, 10 cases were followed up from early pregnancy to term. The remaining 50 cases were between 28 weeks to term and comprised of an unselected group of cases from the antenatal clinic. The

haematological status was determined in each patient prior to the tests. All patients had normal haemoglobin for the period of pregnancy.

The series of anemia in pregnancy consisted of 148 cases. Complete haematological investigation including bone marrow biopsy was done in every patient and the nature of anaemia determined. There were 78 cases of microcytic hypochromic anaemia with normoblastic marrow. Fifty-eight patients had macrocytic ortho- or hypochromic peripheral blood with a moderate number of megaloblasts in the bone marrow. In 12 cases the peripheral blood was macrocytic hyperchromic in character and the marrow showed megaloblastic erythropoiesis. In none of these cases was histamine-fast achlorhydria detected. The haematological data in the 3 groups of cases is shown in Table 1.

TABLE 1

	Microcytic hypochromic	*Dimorphic*	*Macrocytic hyperchromic*
Hb.	4·72 ± 0·72	4·97 ± 0·52	5·17 ± 0·49
R.B.C.	2·42 ± 0·64	1·63 ± 0·49	1·39 ± 0·55
M.C.V.	70·7 ± 3·81	103·4 ± 3·86	112·2 ± 4·17
M.C.H.	19·5 ± 1·41	30·5 ± 1·92	34·3 ± 0·94
M.C.H.C.	27·5 ± 1·23	29·5 ± 1·64	33·2 ± 0·91
Reticulocyte	2·3 ± 0·88	2·0 ± 0·51	1·7 ± 0·55
Bone-Marrow	Normoblasts	Normoblasts and megaloblasts (4-7%)	Normoblasts

TABLE 2—SHOWING IRON BINDING CAPACITY AND IRON SATURATION OF THE PLASMA IN NORMAL PREGNANCY—RESULTS OF FOLLOW-UP IN TEN CASES

		Weeks								
		-12	*13-16*	*17-20*	*21-24*	*25-28*	*29-32*	*33-36*	*37-40*
1.	U.I.B.C.	253	252	257	268	288	300	315	340
	T.I.B.C.	384	379	386	393	398	392	408	422
	I.S.	34·1	33·5	33·4	31·8	30·0	23·4	22·8	19·4
2.	U.I.B.C.	233	230	238	270	282	294	312	340
	T.I.B.C.	350	350	369	372	380	389	402	414
	I.S.	33·4	34·3	33·9	27·4	25·8	24·4	22·3	17·9
3.	U.I.B.C.	263	255	268	282	300	316	330	352
	T.I.B.C.	387	380	388	390	398	406	414	420
	I.S.	32·1	32·9	31·0	27·7	24·6	22·2	20·3	16·2
4.	U.I.B.C.	236	238	241	250	288	297	310	334
	T.I.B.C.	356	359	359	366	382	391	400	407
	I.S.	33·7	32·0	32·9	31·7	24·6	24·0	22·5	17·9
5.	U.I.B.C.	200	200	204	218	238	255	265	290
	T.I.B.C.	298	308	308	326	330	341	345	352
	I.S.	32·2	35·1	33·8	33·1	28·0	25·2	23·2	17·6
6.	U.I.B.C.	210	212	209	224	232	250	265	292
	T.I.B.C.	316	312	309	318	320	336	345	354
	I.S.	33·5	32·0	32·4	29·6	27·5	25·6	23·2	17·5
7.	U.I.B.C.	220	220	224	232	245	268	282	298
	T.I.B.C.	334	332	340	342	345	340	352	352
	I.S.	34·1	33·7	34·1	32·1	29·0	25·9	19·0	15·3
8.	U.I.B.C.	243	240	245	264	270	280	296	314
	T.I.B.C.	370	370	371	375	378	382	390	404
	I.S.	34·3	35·1	34·0	30·4	28·0	26·7	24·1	22·3
9.	U.I.B.C.	263	265	268	276	286	293	305	330
	T.I.B.C.	385	389	393	396	396	399	403	415
	I.S.	31·7	31·9	31·8	30·3	27·8	26·6	24·3	20·4
10.	U.I.B.C.	265	265	276	290	311	322	336	356
	T.I.B.C.	394	388	391	396	403	412	420	428
	I.S.	32·7	31·7	29·4	26·7	22·8	21·8	20·0	16·8

Average ± Standard Deviation

	Weeks								
	-12	*13-16*	*17-20*	*21-24*	*25-28*	*29-32*	*33-36*	*37-40*
U.I.B.C.	234·6	237·7	243·0	257·4	274·0	287·5	301·6	324·6
	23·75	19·38	20·90	24·32	24·32	21·28	19·38	18·62
T.I.B.C.	353·4	355·8	360·5	367·4	373·0	379·6	387·9	397·8
	32·87	26·60	29·64	25·46	25·27	26·79	27·36	25·46
I.S.	33·7	33·2	32·7	30·1	26·8	24·6	21·3	18·1
	0·97	0·56	1·48	1·71	1·71	1·48	1·73	1·96

I.S. = Iron saturation (per cent.)
U.I.B.C.—Unsaturated iron binding capacity μgm./100 ml.
T.I.B.C. = Total iron binding capacity μgm/100 ml.

Results

1. Normal Non-Pregnant Women: In the 50 non-pregnant women studied in this series the mean unsaturated iron binding capacity of the plasma was 227·7 μg. per 100 ml. $\pm$ 16·83. The standard error of the mean was 2·38. The range of values extended between 182 and 258 μg. per 100 ml. The distribution was wide.

The total iron binding capacity of the plasma in these patients varied from 290 to 376 μg. per 100 ml. The mean was 338·3 μg. per 100 ml. $\pm$ 16·38. The standard error of the mean was 2·32.

The mean iron saturation in this series was 32·8 per cent $\pm$ 0·97. The standard error of the mean was 0·037. The iron saturation in individual cases varied from 29·4 to 35·1 per cent.

The frequency distribution of the values is shown in Tables 3-5.

2. Normal Pregnancy: The results in the 10 cases which were followed-up from the third month of pregnancy to term will be presented first. The data are presented in detail in Table 2. It will be seen that both the unsaturated and the total iron-binding capacities of the plasma increase as gestation proceeds. The slight difference in both these values in the third month of pregnancy from the corresponding ones in the non-pregnant state is of no statistical significance. In view of the smallness of the series the data were compared on the normal curve of error and the value for $\frac{x-\mu}{\sigma}$ for the unsaturated iron binding capacity was only 0·65. The corresponding value for the total iron binding capacity was 1·13. At this stage the serum iron level also is not significantly different from that in non-pregnant women. This has been shown in detail in a previous communication (Mukherjee and Mukherjee, 1953). Consequently the iron saturation of the plasma at this state of pregnancy, observed at 33·2 per cent, is not different at a statistically significant level from that in the non-pregnant state. Between the third and fifth month of pregnancy the change in both iron binding capacity of the plasma and iron saturation is insignificant although a tendency towards a slight increase in the iron binding capacity and a slight decrease in the iron saturation becomes evident. From the middle of pregnancy to the end of gestation these changes become marked so that at term the unsaturated iron binding capacity has increased,

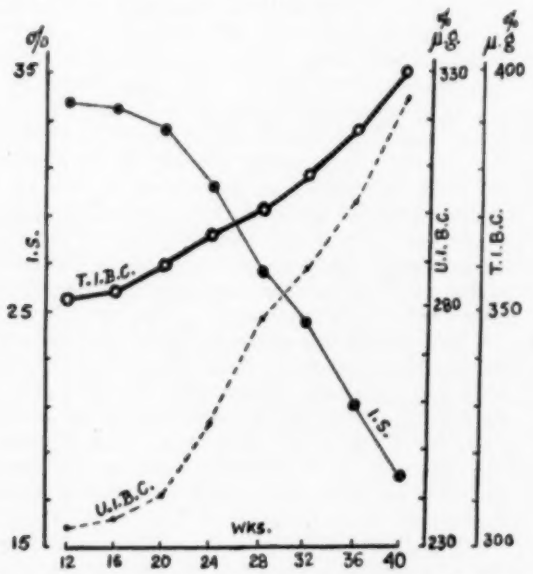

Fig. 1—Showing the Behaviour of Iron Binding Capacity and Iron Saturation in Normal Pregnancy

U.I.B.C.—Unsaturated iron binding capacity.
T.I.B.C.—Total iron binding capacity.
I.S.—Iron saturation of the plasma.

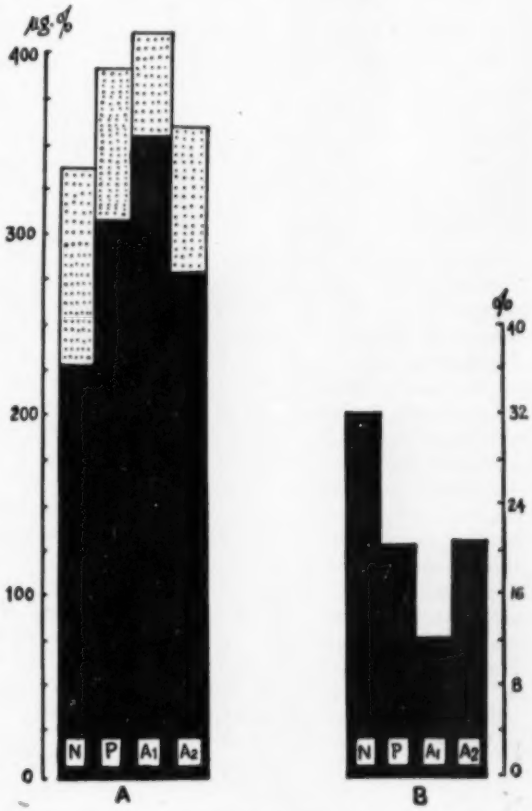

Fig. 2.—Showing, A—Iron Binding Capacity, and B—Iron Saturation of the Plasma in Non-Pregnant Women (N), Normal Pregnancy (P), Iron Deficiency Anaemia (A_1), Nutritional Macrocytic Anaemia (A_2)

In A, the height of each column represents the total iron binding capacity, the blocked area the unsaturated iron binding capacity, and the stippled area the protein bound iron—all in μg. per 100 ml. of plasma

TABLE 3—SHOWING FREQUENCY DISTRIBUTION OF UNSATURATED IRON BINDING CAPACITY OF THE PLASMA IN NORMAL NON-PREGNANT WOMEN, AND IN NORMAL AND ANAEMIC PREGNANCY

Frequency µg./100 ml.		Normal control 50 cases	Anaemias in Pregnancy: Normal Pregnancy 60 cases	Microcytic hypochromic 78 cases	Dimorphic 58 cases	Macrocytic Hyperchromic 12 cases
180-189	...	2	—	—	—	—
190-199	...	4	—	—	—	—
200-209	...	7	—	—	—	—
210-219	...	8	—	—	—	—
220-229	...	9	—	—	—	—
230-239	...	9	—	—	—	—
240-249	...	7	1	—	—	—
250-259	...	4	3	—	—	1
260-269	...	—	3	—	—	0
270-279	...	—	3	—	—	0
280-289	...	—	5	—	1	4
290-299	...	—	6	—	1	5
300-309	...	—	14	2	1	2
310-319	...	—	9	5	4	—
320-329	...	—	6	8	3	—
330-339	...	—	4	11	7	—
340-349	...	—	2	16	6	—
350-359	...	—	3	18	14	—
360-369	...	—	1	10	10	—
370-379	...	—	—	3	6	—
380-389	...	—	—	4	3	—
390-399	...	—	—	1	2	—
Average	...	227·7	309·7	354·6	354·4	280·6
Standard Dev.		16·83	25·92	18·15	19·85	11·70
Standard Error		2·38	3·34	2·05	2·61	3·38

TABLE 4—SHOWING DISTRIBUTION OF TOTAL IRON BINDING CAPACITY OF THE PLASMA IN NORMAL NON-PREGNANT WOMEN, AND IN NORMAL AND ANAEMIC PREGNANCY

Frequency µg./100 ml.		Normal control 50 cases	Anaemias in Pregnancy: Normal Pregnancy 60 cases	Microcytic hypochromic 78 cases	Dimorphic 58 cases	Macrocytic Hyperchromic 12 cases
290-299	...	1	—	—	—	—
300-309	...	5	—	—	—	—
310-319	...	6	—	—	—	—
320-329	...	8	1	—	—	1
330-339	...	8	1	—	—	0
340-349	...	14	2	—	1	1
350-359	...	4	3	2	2	4
360-369	...	3	4	2	4	2
370-379	...	1	7	6	2	2
380-389	...	—	16	7	8	2
390-399	...	—	12	14	9	—
400-409	...	—	6	21	16	—
410-419	...	—	5	11	8	—
420-429	...	—	2	9	3	—
430-439	...	—	1	2	2	—
440-449	...	—	—	3	2	—
450-459	...	—	—	1	1	—
Average	...	338·3	390·35	406·5	404·2	360·6
Standard Dev.		16·38	19·40	17·37	20·04	14·85
Standard Error		2·32	2·50	2·0	2·63	4·40

on an average, by 97 µg per 100 ml. ± 25·09, and the iron saturation has decreased by 14·7 per cent ± 2·18, compared with the corresponding non-pregnant values. Both these changes indicate a high degree of statistical significance. The total iron binding capacity of the plasma is also increased, but as the serum iron concentration is low the increase in the total iron binding capacity is not marked. The difference between the non-pregnant and term level is 59·5 µg. per 100 ml. ± 30·27. Although this difference is noteworthy it is not of a marked statistical significance. The changes in both iron binding capacity and iron saturation are progressive throughout pregnancy but in the second half of gestation these become very evident. However, statistically significant differences do not appear till the end of 32 weeks of pregnancy in the case of the unsaturated iron binding capacity and 28 weeks of gestation in the case of the iron saturation of the plasma. The average values for the last trimester of gestation based on 30 estimations in these 10 follow-up cases are as follows:

Unsaturated iron binding capacity—304·6 µg. per 100 ml. ± 27·36; standard error 4·99. Total iron binding capacity—388·4 µg. per 100 ml. ± 27·74; standard error 5·06. Iron saturation of the plasma 21·3 per cent ± 2·68; standard error 0·49. The difference between these on one hand, and non-pregnant and early pregnancy values on the other, indicates statistical significance, that for iron saturation being most marked (t=4·1) and total iron binding capacity least so (t=1·6).

The second group of 60 cases of normal pregnancy during the last trimester of gestation also showed similar differences from normal subjects. The frequency distribution of the results are shown in Tables 3-5. The unsaturated iron binding capacity of the plasma was 309·7 µg. per 100 ml. ± 25·92. The standard error of the mean was 3·34. The difference from normal non-pregnant value, viz., 82·0 µg per 100 ml. is statistically significant (t=2·65). The range of individual values was from 247 to 370 µg per 100 ml.

The total iron binding capacity of the plasma in this series was 390·35 µg per 100 ml. ± 19·40. The standard error of the mean was 2·50. The difference from the corresponding value in the non-pregnant women, viz., 52·05 µg per 100 ml. is statistically significant (t=2·1). The range of values in individual cases was between 329 and 438 µg per 100 ml.

The average iron saturation in this series of normal pregnancy was found to be 21·82 per cent, the minimum and maximum being 15·3 and 28·7 per cent respectively. The standard deviation of the mean was 2·52, and the standard error 0·32. The difference in iron saturation from normal non-pregnant persons, viz., 11·0 per cent indicates a high degree of statistical significance (t=4·1).

The difference between the values obtained in the last trimester of gestation in the two series of cases is negligible and is of no statistical significance. So, in order to obtain a larger universe, the two series have been compiled together in order to obtain the collected average values for the last trimester of normal preg-

TABLE 5—SHOWING DISTRIBUTION OF IRON SATURATION OF THE PLASMA IN NORMAL NON-PREGNANT WOMEN, AND IN NORMAL AND ANAEMIC PREGNANCY

				Anaemias in Pregnancy		
Frequency µg./100 ml.	*control Normal 50 cases*	*Normal Pregnancy 60 cases*	*Microcytic hypochromic 78 cases*	*Dimorphic 58 cases*	*Macrocytic Hyperchromic 12 cases*
7·1-8	... —	—	2	2	—
8·1-9	... —	—	3	5	—
9·1-10	... —	—	6	4	—
10·1-11	... —	—	10	6	—
11·1-12	... —	—	15	10	—
12·1-13	... —	—	12	12	—
13·1-14	... —	—	12	6	—
14·1-15	... —	—	8	4	—
15·1-16	... —	1	7	4	—
16·1-17	... —	2	2	2	—
17·1-18	... —	4	1	1	1
18·1-19	... —	5	—	1	1
19·1-20	... —	8	—	1	0
20·1-21	... —	11	—	—	2
21·1-22	... —	7	—	—	2
22·1-23	... —	7	—	—	1
23·1-24	... —	5	—	—	2
24·1-25	... —	3	—	—	0
25·1-26	... —	2	—	—	1
26·1-27	... —	3	—	—	1
27·1-28	... —	1	—	—	1
28·1-29	... —	1	—	—	—
29·1-30	... 2	—	—	—	—
30·1-31	... 5	—	—	—	—
31·1-32	... 8	—	—	—	—
32·1-33	... 22	—	—	—	—
33·1-34	... 9	—	—	—	—
34·1-35	... 3	—	—	—	—
35·1-36	... 1	—	—	—	—
Average	... 32·80	21·82	12·86	12·91	22·20
Standard Dev.	0·97	2·52	1·95	2·34	2·57
Standard Error	0·037	0·32	0·22	0·31	0·74

nancy. These, based on 90 estimations done on 70 patients, are as follows:

The mean unsaturated iron binding capacity of the plasma is 307·7 µg per 100 ml. ± 26·41. The standard error of the mean is 2·78.

The mean total iron binding capacity of the plasma is 389·7 µg per 100 ml. ± 24·70. The standard error of the mean is 2·59.

The mean iron saturation of the plasma is 21·6 per cent ± 2·77. The standard error of the mean is 0·29.

3. ANAEMIAS IN PREGNANCY: A total of 148 cases have been studied in this series. It has been mentioned previously that bone marrow biopsy and haematological studies have indicated that the series included three types of cases of anaemia. The results in these three types have been presented separately.

(i) *Microcytic hypochromic anaemia (78 cases)*—The mean unsaturated iron binding capacity of the plasma was 354·6 µg per 100 ml.; standard deviation, 18·15. The standard error of the mean was 2·05. The maximum and minimum values in this series were 398 µg and 308 µg per 100 ml. respectively. The scatter of distribution shows a moderate amount of overlapping with that found in normal pregnancy although the values in anaemia show a considerable shift to the right. The distribution shows a normal curve of error. The difference of 46·9 µg per 100 ml. between the unsaturated iron binding capacity of this series of anaemias and that of the last trimester of normal gestation is of statistical significance.

The mean total iron binding capacity in the present series was found to be 406·5 µg. per 100 ml. The scatter of values occupied a range between 352 and 458 µg per 100 ml. The standard deviation of the mean was 17·37 and the standard error 2·0. The difference in the total iron binding capacity between the last trimester of normal pregnancy and the present group of anaemia, viz. 16·8 µg per 100 ml. is less than one standard deviation of the difference and therefore does not indicate statistical significance.

The mean iron saturation of the plasma in this series was 12·86 per cent with a standard deviation of 1·95. The standard error of the mean was 0·22. The scatter of values extended between 7·6 and 18·3 per cent. The distribution shows a distinct shift to the left and less than 13 per cent of the values overlapped the lower limits of the normal range. The difference of 8·74 per cent iron saturation between the last trimester of normal pregnancy and the present series is 2·88 times the difference of the standard deviations of the means and so indicates statistical significance.

(ii) *Dimorphic Anaemia*—This group of 58 cases have been considered separately as the sternal marrow biopsy showed both normoblastic and megaloblastic erythropoiesis, suggesting the presence of a state of both iron and nutritional deficiency. The mean unsaturated iron binding capacity in this series was 354·4 µg per 100 ml. The standard deviation of the mean was 19·85 and the standard error 2·61. The individual values showed a wider scatter than those in iron deficiency anaemia. The coefficient of variation was also higher than that in the previous group. No significant difference in the unsaturated iron binding capacity of the plasma was observed between these two groups of anaemias in pregnancy. The difference between this group of anaemias and the last trimester of normal gestation however shows statistical significance.

The mean total iron binding capacity in this group of 58 cases was 404·2 µg per 100 ml. The maximum and minimum values were 344 and 452 µg. per 100 ml. The standard deviation of the mean was 20·04 and the standard error 2·63. The distribution of values was almost similar to that in iron deficiency anaemia. The difference between the means of the two groups is almost negligible and is of no statistical significance. The difference between the total iron binding capacity in the last trimester of normal gestation and that in the present group of anaemia is 14·5 µg per 100 ml. The

standard deviation of this difference is 31·8. Therefore this difference is not statistically significant.

The mean iron saturation of the plasma in these cases was 12·91 per cent, with 2·34 as the standard deviation of the mean. The standard error was 0·31. The maximum and minimum iron saturation in this group was 7·2 and 20·2 per cent respectively. The scatter of values was slightly greater than that in simple iron deficiency anaemia. The differences in iron saturation between these two groups of anaemias are hardly noteworthy. However, the corresponding difference between this group of anaemia and the value obtained in the last trimester of normal gestation is 2·4 times the standard deviation of the difference and is therefore of statistical significance.

(iii) *Macrocytic Hyperchromic Anaemia*—This series consists of only 12 cases. Statistical correlation with such a small number of cases is difficult but the results show interesting comparative findings.

The average unsaturated iron binding capacity was 280·6 μg per 100 ml. Nine out of the 12 values were less than 300 μg per 100 ml. A similar range was occupied by only 35 per cent of cases of normal pregnancy and less than 3 per cent of cases of iron deficiency anaemia. Standard deviation of the mean in the present series was 11·70 and the standard error 3·38. Compared with normal pregnancy the decline in value is not of high statistical significance. However, the difference in the unsaturated iron binding capacity between the nutritional macrocytic and iron deficiency anaemias viz. 83·0 μg per 100 ml. is statistically significant ($\frac{x-\mu}{\sigma} = 7·1$).

The mean total iron binding capacity was 360·6 μg. per 100 ml. The standard deviation was 14·85 and the standard error 4·40. The distribution of values shows a distinct tendency to a shift to the left compared to that in the last trimester of normal pregnancy, and more so when compared to that in microcytic hypochromic anaemia. With normal pregnancy, the difference of the means is not statistically significant. But, the difference between the mean total iron binding capacities of iron deficiency and nutritional macrocytic anaemias is 45·9 μg and is of some statistical significance ($\frac{x-\mu}{\sigma} = 3·1$).

The mean iron saturation of the plasma in this group of 12 cases was 22·0 per cent, with a standard deviation of 2·57, and a standard error of 0·74. The coefficient of variation was high but the distribution was similar to that in normal pregnancy. Compared with iron deficiency anaemia, however, the scatter shows a shift to the right and the difference between the mean iron saturation of the two groups viz. 9·34 per cent is of good statistical significance ($\frac{x-\mu}{\sigma} = 4·8$).

Discussion

The exact mechanism of the transport of iron in the body for metabolic purposes has been only recently understood. The iron binding capacity of the plasma gives an indirect estimate of the iron carrying protein present in the blood. Schade and Caroline (1946) stated that the total iron binding capacity of normal sera is about 300 μg., which represents about 250 mg. of Cohn's β_1 globulin fraction per 100 ml. of serum. Normal values for both total and unsaturated iron binding capacities of the plasma seem to show some variation according to different authors. Thus, Laurel (1947) records the total and unsaturated iron binding capacities as 315 and 207 μg per 100 ml. respectively. Corresponding values given by subsequent authors are 371 and 248 μg (Cartwright and Wintrobe, 1949), 336 and 194 μg (Rath, *et al*, 1950), 328 and 217 μg (Ventura and Klopper, 1951) per 100 ml. The present investigation made on Indian subjects showed that the total and unsaturated iron binding capacities of the serum were 338 and 228 μg per 100 ml. The series of cases reviewed in the present investigation is so far the largest in normal female and judging from the range of values obtained by other investigators it appears that the iron binding capacity of the serum in Indian women is not significantly different from those recorded in America, European Continent and Great Britain. However, this does not represent the true state of affairs, for both plasma volume, and plasma protein concentration in Indian women are somewhat lower (*vide infra*) than those in women of western countries. Consequently, the total iron carrying protein content of the body in women in India are to some extent less than that noted by western observers. The iron saturation of the plasma in the present series of non-pregnant women was 32·8 per cent $\pm$ 0·97. This is similar to the values obtained from the data presented by Laurell (1947); 34·9 per cent), Cartwright and Wintrobe (1949; 33·0 per cent), Rath, *et al* (1950; 32·6 per cent) and Ventura and Klopper (1951; 33·8 per cent).

The increase in the iron binding capacity of the plasma during pregnancy has also been noted by the authors mentioned above. The extent of the increase however, shows some degree of variation in the different series. Thus, in the cases reported by Rath *et al* (1950) the increase of the total and unsaturated iron-binding capacity of the plasma seen at full-term pregnancy was only 48 and 40 μg. respectively per 100 ml. The corresponding increases observed by Fay, Cartwright and Wintrobe (1949) were by as much as 212 and 257 μg respectively per 100 ml. So far, these appear to be the extreme limits of variation. In the present series of cases, at full term pregnancy, the total and unsaturated iron binding capacities of the plasma were found to be enhanced by 59 and 97 μg. respectively per 100 ml. These correspond to an increase of 17·2 and 42·5 per cent respectively of the

basic non-pregnant values. Rath and Finch (1949) working with pure β_1 globulin showed that one milligram of protein combines with about 1·25 μg. of iron. The iron binding capacity of the plasma in the non-pregnant women in the present series represents 270 mg. of iron carrying protein per 100 ml. of plasma. The average plasma protein concentration in these cases was 7·39 g. per 100 ml. ± 0·24. The iron carrying protein in the non-pregnant women in the present series therefore constituted 3·6 per cent of the total protein content of the plasma. Cartwright and Wintrobe (1949) quoting a personal communication from Cohn state that normally the iron carrying protein constitutes about 3 per cent of the plasma proteins. On the same basis of calculation the concentration of the iron carrying protein in normal pregnancy at term appears to be 318 mg. per 100 ml. The total plasma protein concentration in this series at term was 6·50 g. per cent ± 0·23. Thus, the iron carrying protein comprised of 4·9 per cent of the total plasma proteins. It, therefore appears that the increase in the iron binding capacity of the plasma during pregnancy is due to an absolute increase to the extent of about 48 mg. per 100 ml. in that fraction of serum protein which has the property of carrying iron. This is further shown by the fact that the increase in the unsaturated iron binding capacity of the plasma is considerably more than the depreciation in the serum iron concentration during pregnancy. It has been shown in a previous communication that the decrease in the serum iron level at full term pregnancy on an average amounts to 43 μg per 100 ml. (Mukherjee and Mukherjee, 1953). This is accompanied with an increase in the unsaturated iron binding capacity of not an equivalent amount, but 97 μg. per 100 ml. ± 25·1. The difference between the decrease in serum iron and the increase in the unsaturated iron binding capacity is significant and proves that a true gain in the iron carrying protein content of the plasma occurs at full term pregnancy.

However, the process is gradual, the maximum increase is observed towards the end of the period of gestation. In the first half of pregnancy the increase in the iron binding capacity of the plasma is slight and insignificant. In the second half the change is marked. More than 50 per cent of the total gain takes place in the last trimester of gestation.

This increase in the iron binding capacity of the plasma, together with a fall in the serum iron concentration is responsible for two effects which are revealed by this investigation. (1) The increase in the total iron binding capacity of the plasma is proportionately less than that of the unsaturated iron binding capacity, the difference between the two being accounted for by the depreciation of the serum iron level. (2) The iron saturation level of the plasma falls. Cartwright and Wintrobe (1949) observed that in normal women iron is carried in such a way that 33 per cent, ± 4·92, of the iron carrying proteins of the plasma are used up for the purpose, this being regarded as the normal iron saturation level. Excepting Laurell's (1947) data which gives an iron saturation of 37 per cent in normal women, all other available data in the literature indicate a degree of iron saturation in women similar to that given by Cartwright and Wintrobe. In the present series of 50 cases the iron saturation level of normal women in India was found to be 32·8 per cent ± 0·97. It is a point of interest to note that in spite of frequency of tropical gastrointestinal disorders in India the normal iron saturation level of the plasma shows no significant difference from those reported from other parts of the world. It can, however, be seen from the frequency table that 80 per cent of the women in this series showed less than 33 per cent iron saturation. The frequency of the low normal values probably indicate a rather delicate state of iron saturation and account for a high incidence of anaemia when an additional load, such as pregnancy, is superimposed.

During normal pregnancy the level of iron saturation falls. This has been demonstrated in the follow-up studies. Up to the first five months of pregnancy the level of iron saturation was not found to decrease. From the sixth month onward the fall in iron saturation became evident and progressive. Taking 33 per cent as the normal iron saturation level in women, the depreciation in iron saturation amounted to 9 per cent, 19 per cent, 25·5 per cent, 35·5 per cent and 45 per cent respectively of the normal value in each successive month of the second half of pregnancy. Thus, the depreciation is maximum at full-term pregnancy and the gradient is fairly uniform. In the present series the mean iron saturation in the last trimester of gestation based on 90 estimations was found to be 21·6 per cent ± 2·77, but in the last month of pregnancy the iron saturation was 18·1 per cent ± 1·96. Data from the literature with regard to iron saturation at term pregnancy show considerable variation, although the number of reports dealing with this aspect of iron metabolism are rather few. Values are found to vary from 10 per cent (Fay *et al*, 1949) to 27 per cent (Rath, *et al*, 1950). It should be noted however that these data are not based on a follow-up study of the same series of patients observed throughout pregnancy.

The fall in the iron saturation in pregnancy is obviously due to a diversion of the iron from the maternal circulation in order to meet the foetal requirements. This explains why the depreciation is marked at a period when foetal growth is rapid. This will be demonstrated by an experiment described below. Twenty-eight cases of normal pregnancy between 38 and 39 weeks of gestation were selected for this study. None of these patients suffered from any constitutional disorder or presented any haematological evidence of anaemia. The serum iron and saturation level of the plasma were normal for this period of gestation. Each of these subjects was then put on 25 mg. intravenous iron daily for one week, after which the iron saturation of the plasma was determined. The changes

observed are shown in Table 6. The data clearly indicate that administration of iron to the mother in order to "cover" the foetal needs not only arrests the downward trend but actually improves the status of the iron saturation level of the plasma. The difference in the iron saturation of the plasma before and after the experiment is of statistical significance. This improvement is not accompanied with any significant change in the total iron binding capacity of the plasma. However the unsaturated iron binding capacity falls appreciably. This indicates that under the conditions of the experiment there is an increase in the transportable iron content of the blood. It is obvious that such a state has been rendered possible by overcoming a state of iron debt in the circulation of the mother.

TABLE 6

	U.I.B.C. *μg./100 ml.*	*T.I.B.C.* *μg./100 ml.*	*I.S.* *per cent*
Original	319·6 17·48 (291 – 350)	400·2 22·23 (360 – 434)	20·3 2·37 (17·2 – 22·9)
After I. V. iron	294·7 19·71 (262 – 335)	406·5 25·10 (362 – 441)	27·4 2·52 (21·6 – 31·0)
Mean of the difference	26·2	7·8	7·0
Standard deviation of the mean difference	3·12	1·80	0·37

U.I.B.C. = Unsaturated iron binding capacity.
T.I.B.C. = Total iron binding capacity.
I.S. = Iron saturation.

This has an important bearing in the study of the iron binding capacity of the plasma in anaemias in pregnancy. Rath and Finch (1949) observed that in iron deficiency anaemias the iron binding capacity of the serum increases. This has been confirmed by other investigators as well. Cartwright and Wintrobe (1949) found the total iron binding capacity to increase to 450 μg. per 100 ml. or more depending upon the degree of anaemia. The present investigation deals with only anaemias associated with pregnancy. On haematological findings the cases have been divided into three groups; viz., microcytic hypochromic dimorphic and macrocytic hyperchromic anaemias. On the basis of the status of iron metabolism only two distinct types can be made out: (1) Those where signs of iron deficiency are present and (2) Those where the status of iron metabolism does not appreciably differ from that in normal pregnancy.

The first group includes the microcytic hypochromic and dimorphic anaemias. The status of the serum iron concentration in these cases has already been described in a previous communication (Mukherjee and Mukherjee, 1953). The present study shows that both unsaturated and total iron binding capacity are increased in these cases. The difference in the values between iron deficiency and dimorphic anaemias is in no way worthy of note. Compared with normal pregnancy however the difference is more noticeable and significant. The average total iron binding capacity of the 136 cases comprising of the iron deficiency and dimorphic anaemias is 405·5 μg. per 100 ml. This would represent a concentration of 0·32 g. of iron carrying protein per 100 ml. of plasma (Finch *et al*, 1949). The average plasma protein concentration in these cases was found to be 5·7 g. per 100 ml. The iron carrying fraction therefore constituted 5·6 per cent of the total plasma protein. This indicates a true increase in the iron carrying protein content of the plasma. However, compared with normal pregnancy the gain is only slight and does not show a high degree of statistical significance. A study of the iron saturation however, reveals a gross depreciation in both iron deficiency and dimorphic anaemia. Compared with level of iron saturation of the plasma in normal pregnancy the present series of anaemias showed a deficit of 40 per cent of the expected level. At this stage a high degree of statistical significance has been observed. The mean iron saturation in the present series of about 13 per cent, is slightly higher than that reported by some of the observers in simple iron deficiency anaemia (Cartwright and Wintrobe, 1949; 2·8 to 9·5 per cent). Close scrutiny of the data supplied by these authors show that while the serum iron level does not show any significant difference between the present series and those referred to above, the iron binding capacity of the serum observed by these authors seem to be much higher than that found in the present investigation. This is obviously responsible for the slightly higher value of iron saturation found in this study. In order to find the cause of this fallacious finding a careful search of the clinical history of these patients was made, and it was found that of the 136 cases of iron deficiency and dimorphic anaemia in 123 latent or active infection (bacterial, protozoal or helminthic) was present. In the 13 cases where focal infection was not discovered the iron binding capacity was unmistakably higher than those where infection was present. In the non-infected group the iron saturation was distinctly lower (average, 8 per cent) than that in those where infection was present (average 14·9 per cent). Detailed statistical analyses of the data from such disproportionate universe are unsatisfactory, but a x^2 test was found significant at 0·01 level. In 29 cases in this series splenic enlargement was present and in 11 cases the liver was enlarged. In these 40 cases with splenic and hepatic enlargement the iron binding capacity of the plasma was uniformly low. The maximum total iron binding capacity was 376 μg. per 100/ml., while the iron saturation level varied from 12 to 21 per cent. Cartwright and co-workers (1946) also observed a depreciation of the iron binding capacity of the plasma in presence of infection. The number of cases of nutritional macrocytic anaemia studied here is small. However, the results point to a striking difference in the nature of iron metabolism in iron deficiency and

TABLE 7

	Non-pregnant women	*Normal pregnancy*	*Iron deficiency anaemia*	*Nutritional macrocytic anaemia*
Plasma vol ml./Kg	45·0± 3·17	52·4± 4·66	55·1± 6·14	54·2 ± 5·82
T.I.B.C. μg. per cent	342·0±21·8	395·2±26·6	408·7±22·5	357·7 ±18·9
Iron carrying protein mg. per cent	274 ±21·6	316 ±26·5	327 ±22·6	286 ±18·8
Iron carrying protein mg./kg.	123·3± 9·3	165·6±11·8	180·2±13·1	155·0 ±10·1
: with non-preg. per cent	—	+ 34·3± 1·12	+ 46·1± 2·35	+ 25·7 ± 2·26
: with normal preg. per cent	—	—	+ 13·6± 1·92	− 6·4 ± 0·96

macrocytic anaemias in pregnancy. The iron binding capacity is significantly low in the latter group of cases, the unsaturated iron binding capacity being affected more than the total iron binding capacity. This is because, unlike iron deficiency anaemia the serum iron depletion is not a marked feature in nutritional macrocytic anaemia. The total iron binding capacity in this series (viz. 360·6 μg. per 100 ml.) represents a concentration of 0·288 g. of iron carrying protein per 100 ml. of plasma. The average plasma protein concentration in this series was 5·8 g. ± 0·51. Thus, the iron carrying protein consisted of 4·9 per cent of total proteins. Indeed, this is almost similar to the concentration found in normal pregnancy, and the compensatory increase in iron carrying proteins, which constitutes an important feature in the two previous types of anaemias in pregnancy is lacking in this condition. This has an important significance, and is best appreciated when the alterations in the plasma volume are taken into consideration. The circulating volume of the plasma was estimated by the Evan's blue method in 10 cases in each group. As is well known, the individual variations in plasma volume are often marked. The results were therefore resolved to ml. per Kilogram of the body weight in order to obtain a uniform standard of comparison. These results are summarised in Table 7. The gain or loss of the iron carrying protein content of the blood, summarised in the last two columns of the table are of good statistical significance at each stage. This indicates that the status of iron metabolism in nutritional macrocytic anaemia is notably different from that in microcytic hypochromic anaemia. There is a true deficit in the iron carrying protein content of the plasma in the former condition, whereas in the latter this is actually increased by about one-tenth of the normal pregnancy level.

The decrease in the iron binding capacity of the plasma is not associated with an appreciable fall in the serum iron level. This is shown also by the state of the iron saturation of the plasma. The level of iron saturation is considerably higher than that in microcytic hypochromic anaemia. In fact, this approaches the value observed in normal pregnancy. The transport and turnover of iron in these cases are not faulty. This is in striking contrast to what is found in microcytic hypochromic anaemia in pregnancy. From the point of view of iron metabolism the dimorphic anaemia also shows features which are nearer those of iron deficiency than those of nutritional macrocytic anaemia.

SUMMARY AND CONCLUSIONS

1. Results of a study of the plasma iron binding capacity and iron saturation in 148 cases of anaemia in pregnancy are presented.

2. These consisted of 78 cases of iron deficiency, 58 cases of dimorphic and 12 of nutritional macrocytic anaemia. The control study was based on an identical investigation in 70 cases of normal pregnancy and 50 normal non-pregnant women. Moreover, 10 cases of normal pregnancy were followed from early pregnancy to term.

3. Results showed that in normal pregnancy there is an increase in the iron binding capacity and a decrease in the iron saturation level of the plasma. These changes are clearly demonstrable in the second half of gestation and reach their extreme limits at term. The relative concentration of the unbound iron carrying protein of the plasma increases more than that of the total iron carrying protein.

4. In both iron deficiency and dimorphic anaemias in pregnancy these changes are exaggerated. However, if focal infection is present there is a brake on the natural process of the increase in the iron binding capacity of the plasma. In these cases, if iron absorption is not simultaneously interfered with the iron saturation level may remain erroneously high. This may provide a false information regarding the status of iron metabolism in this condition.

5. In nutritional macrocytic anaemia the iron-binding capacity of the plasma was found to be somewhat less than that in normal pregnancy, and considerably less than that in iron deficiency anaemia. The iron saturation level approached that of normal gestation. The series is however small and definite conclusions are not possible at this stage.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the help and co-operation received from Professor H. L. Saha and Mr. Arun Dutta Gupta of the Physiology Department and Principal A. K. Dutta Gupta of the Nilratan Sarkar Medical College.

The investigation was made possible by a grant from the Indian Council of Medical Research.

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THE ROLE OF RESECTION IN PULMONARY TUBERCULOSIS*

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The last decade saw the evolution and establishment as a definite therapeutic measure of the surgical excision of tuberculous pulmonary tissue. Since the publication in 1943 by Churchill and Klopstock of the first series of cases deliberately thus treated, many more reports have come from different parts of the world. The discovery of penicillin and later on of streptomycin has been the major factors that have accelerated the progress of this therapy. It is needless to say that the many other phenomenal advancements in different aspects of thoracic surgery have also been great contributory factors.

We presented the first Indian series in February 1952 at the Annual Tuberculosis Workers' Conference at Lucknow. This was a very limited group of cases wherein the indication for resection was the basal situation of the tuberculous lesion. In November 1952 we reported the results of 74 pulmonary resections for tuberculosis. The present paper is based on a review of the first 100 resections for the same disease. These resections were done on 98 patients, two having had two resections and these were done over a period of 54 months.

TABLE (a)

Total Resections	...	334
Tbc. Resections	...	100

100 resections on 98 patients—one had bilateral resection, one had Rt. ML and RLL after that RUL

	Male	*Female*	*Total*
Cases	... 60	38	98
Operations	... 61	39	100

Before a new type of therapy can be accepted, it is imperative that critical appraisal of clinical sucesses and failures and careful comparisons should be made with hitherto existing forms of treatment. It is necessary to list the advantages and the disadvantages and also explore the possibilities in those aspects of the disease which have defied or seldom yielded to the other measures.

Young (1953) looking at the whole problem from a physician's point of view, considers that there were three reasons for accepting resection in a series of 78 cases of pulmonary tuberculosis.

i. Where the alternative was chronic invalidism with the prospects of rapid deterioration and early death.

ii. Where the alternative was some other type of major surgery, probably more than one procedure.

iii. In cases where conservative treatment was possible, like tuberculoma and inspissated cavities, where the sputum was negative.

The arguments are simple enough. If the standard and tried out weapons in the armamentarium of the phthisiologist are found to be inadequate in continuing the fight and saving the patient from certain death, then it is necessary to find new ones. Extirpation is a radical procedure. It is true that tuberculosis is not a localised disease and in addition minute foci of the disease may be present elsewhere in the body including the rest of the lungs. But then the body defences and drugs can get a better chance against these smaller lesions once the gross disease is removed.

Again, if the treatment is going to be by other types of major surgery like thoracoplasty, the pulmonary function may be greatly reduced. Also, because of the deformity it produces and because of the necessity for more than one stage operation this surgical procedure may be unsuitable in a particular case.

Young's plea that tuberculomata and inspissated cavities with negative sputum should be submitted to

*A paper read at the 13th Karnataka and Maharashtra Regional Conference of the Indian Medical Association, held at Sangli on 24-4-53.

conservative therapy rather than excision shows an unwise attitude. We have seen tuberculomatcus lesions excavate and spread while awaiting surgery and what probably could have been a more limited resection had to be greatly extended. Again, the roentgen shadow cast by a tuberculoma is also characteristic of other conditions which include cancer, and exploration is the safest choice to avoid disaster.

Resection is rarely offered when other types of therapy are indicated or are sufficient. The disease, however, sometimes manifests lesions that will not yield to the usual treatment or may under it prolong the morbidity and the convalescence. Also the psychological benefit, the elation the patient feels at having got rid of the diseased lung, is not to be minimised. However, this has its pitfalls as it is not unnatural for the patient to throw caution to the winds because he now feels and thinks he is cured.

Extirpative therapy is increasingly being applied now to tuberculous lesions which probably may respond to more conservative treatment. Satisfactory results are claimed and because in efficient hands the mortality of pulmonary resection is low especially with the protection of the antibiotics a long, tedious and expensive stay in a tuberculosis sanatorium can be avoided. Segmental resection as advocated by Chamberlain is becoming increasingly popular as one may be led to believe from the accumulating literature on the subject. Again, Ryan *et al* have advocated simple excision of tuberculous tissue irrespective of segmental anatomy. The primary aim in both these procedures is to sacrifice the minimum tissue and to conserve good functioning lung. As the scope and safety of resection are being established on the bedrock of greater technical and other improvements and increased experience, the indications are being extended.

Most authorities are agreed upon the indications for resection although different surgeons list them under different analytical heads. In our Service, the indications for resection have been considered under the following heads:

i. Thoracoplasty failure
   - (a) Predominantly pulmonary
   - (b) Predominantly bronchial.

ii. Predicted thoraccplasty failure
   - (a) Bronchial disease
   - (b) Location
   - (c) Tuberculoma
   - (d) Associated suppurative disease
   - (e) Preservation of function

iii. Elective resection
   - (a) Associated empyema
   - (b) Unexpanded A.P.
   - (c) Extensive unilateral disease
   - (d) Thick walled cavities.

TABLE I

	Total	*Pneumonectomy*	*Lobectomy*
I. Thoracoplasty failure ...	12 (12%)		
A. Predominantly pulmonary	8	5	3
B. Predominantly bronchial ...	4	4	0
II. Predicted Thoracoplasty failure ...	61 (61%)		
A. Bronchial disease	13	12	1
B. Location ...	40	9	31
C. Tuberculoma ...	0	0	0
D. Associated suppurative disease ...	2	1	1
E. Preservation of function ...	6	0	6
II. Elective Resection ...	23 (23%)		
A. Empyema and associated pulmonary tuberculosis ...	8	4	4
B. Unexpanded A.P.	0	0	0
C. Extensive unilateral disease ..	15	13	2
IIA. & B. Bronchial disease and location ...	2 (2%)	0	2
IIA. & C. Bronchial disease and tuberculoma ...	1 (1%)	0	1
IIIA. & C. Bronchial disease and extensive unilateral disease ...	1 (1%)	1	0

It is evident from the above that certain indications can be considered under other headings also. Again in certain cases more than one indication may coexist.

I. Thoracoplasty failure—A thoracoplasty may prove to be a failure either due to an inadequate collapse or a wrong selection of the case. A tension cavity or a cavity with a very thick unyielding wall is unlikely to give the desired result after a thoracoplasty. Again, an ipsilateral spread of the disease may occur at a later date. If there is no contraindication, excision of the collapsed lung is the treatment of choice.

II. Predicted thoracoplasty failure—There are certain types of lesions which a thoracoplasty cannot adequately control:

(a) In the presence of bronchial disease, like bronchostenosis, as proved by bronchoscopy or as evidenced by a tension cavity, thoracoplasty is inadvisable.

(b) The location of a cavitary lesion has to be considered before choosing the exact type of surgery. Basal lesions or lesions close to the paravertebral gutter do not respond well to thoracoplasty.

(c) Tuberculoma should be treated by excision rather than by thoracoplasty.

(d) Associated suppurative, like secondary infection or bronchiectasis is a definite contraindication for thoracoplasty.

(e) In certain types of cases, especially when it is important to conserve functioning pulmonary tissue as in bilateral lesions or cases where unaffected lobes are bound down and prevented from functioning, resection is the treatment of choice.

III. Electric Resection—In certain types of cases an elective resection is advised:

(a) In cases associated with empyema, pleuropneumonectomy, as advised by Sarot, gives the best result.

(b) In cases where the affected and unaffected lobes of the lung fail to expand after A.P., resection should be considered. This can be considered also under preservation of function.

(c) A case with an extensive unilateral disease should be submitted to resection at the earliest safe period before the disease spreads to the only remaining normal lung.

(d) A thick walled cavitary lesion is best resected rather than offered any other type of operation or other therapy.

A careful assessment of a patient before submitting him to resection is most essential for a good result. We have not found age itself a contraindication.

TABLE (b)

Age Group in Years	*Number*
0—10	3
11—20	16
21—30	53
31—40	20
41—50	7
51—60	1

The youngest in the series was two years old while the oldest was 55. A determination of pulmonary function in indicated cases avoids many tragedies. Recently we have been able to do full function studies and every border line case has been carefully evaluated prior to decision regarding surgery. We have found the breath holding test to be not always a reliable test of the pulmonary function.

The duration of the disease as such has no bearing on the fitness of the patient for undergoing resection or on the result of the operation. However, very often long standing cases have had disease on the contralateral side and also have had much chemotherapy and as it often happens simple collapse procedures either on the same side or on the other. The assessment of such a case for resection has to be carefully made. In our experience cases which received too much streptomycin are prone to develop postoperative complications, like spread of the disease and bronchopleural fistula. Previous collapse procedures cut down the function on that side greatly so that decision, especially for a pneumonectomy on the other side is very difficult.

The extent of resection in most cases has been based on a correlative study of the x-rays and physical examination. However, preoperative bronchoscopy has in a few cases altered our decisions. Bronchial stenosis at a higher level in some cases meant extirpation of a lobe or a lung rather than only a segment or a lobe in which there was parenchymal disease. Again, thoracotomy may reveal a more extensive lesion than the x-ray suggested. At the end of a limited resection it is necessary to make sure that the remaining lung can fill up the chest. If not, it may be necessary to complete the pneumonectomy lest postoperative atelectasis, empyema or both may develop. A reduction of the size of the chest cavity by thoracoplasty at a later date or phrenic interruption depending upon the size of the previous lesion has almost always been done. Resection and simultaneous thoracoplasty as advocated by some is, in our opinion, too drastic a procedure for the average Indian patient.

TABLE 2

	Total	*Right*	*Left*
Pneumonectomy ...	49	18	31
Bilobectomy ...	9	9	0
Lobectomy ...	31	16	15
Segmental ...	5	2	3
Lobectomy and Segmental ...	5	4	1

The following early postoperative complications have been met with in this series:

TABLE 3

Type	*Pneumonectomy*		*Lobectomy and Segmental*	
	Without streptomycin therapy	*With streptomycin therapy*	*Without streptomycin*	*With streptomycin*
Contralateral spread		2		
Ipsilateral ,,				3
Bilateral ,,				1
Pyogenic empyema				1
Bronchopleural fistula with empyema and spread		0		3
Bronchopleural fistula with empyema		1		2
Transient atelectasis ...		1		3
Contralateral spontaneous pneumothorax		1		
Pericarditis		1		
Asthma		2		0
Chestwall infection		2		3

Two facts are evident from the above. One, that spread of the disease and bronchopleural fistula with its sequelae are the most important complications. Two, the complications are directly related to the amount of chemotherapy the patient had previously. This, in turn, as previously stated has a bearing on the extent and duration of the disease because longstanding and extensive cases almost invariably have had prolonged chemotherapy. All those who showed postoperative tuberculous complications were sputum positive at the time of surgery, confirming Young's observations.

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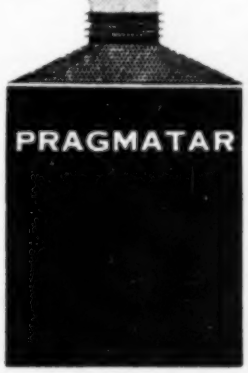

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TABLE 4

	Total
Deaths ...	... 9 (9%)
Postoperative shock	... 3
Respiratory insufficiency	... 4
Cardiac failure ...	... 2

The four deaths due to respiratory insufficiency could have been avoided if full function studies were possible prior to surgery. The seven cases who died from shock and respiratory insufficiency had pneumonectomies.

At the time of discharge the radiological results were satisfactory in all except the six which showed spread. The sputum conversion is shown in Table 5.

TABLE 5

	Before	After
Positive ...	... 75	2
Negative ...	... 25	98

A complete follow up of these cases is being done and as the full data are not yet available we are not presenting them here. As far as we can say at this stage the end results have been very encouraging.

Resection is not a panacea for tuberculosis. It is but an incident in the treatment of the disease. If cases for resection can come in from a sanatorium and can return to it for a period, the ideal preoperative preparation and postoperative convalescence can be assured.

Pulmonary resection should not be considered as the last resort in therapy. We have had many cases that have had all the known methods of treatment prior to admission for surgery. Indiscriminate use of collapse procedures may greatly reduce pulmonary function and increase the chances of spread of disease due to it being contraselective; streptomycin given over prolonged periods may encourage the development of resistant bacilli. Postoperative complications like respiratory insufficiency, empyema or spread of disease may be the unfortunate consequences of these.

What is the role of resection in pulmonary tuberculosis? We can only say that many patients whose days were apparently numbered could be given back an additional lease of life. Many others who have been sick and ailing and were physical and mental cripples and who were without any hope of returning to a normal life could be transformed into men and women who found life worth living. Seeing them many others who were despondent found encouragement. This is sufficient testimony to the efficacy of the method.

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REDUCTION OF MUSCULAR PERFORMANCE DURING MENSTRUATION*

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It has been observed by several workers a few decades ago that certain toxic effects resulted from the action of various secretions obtained from menstruating women upon plant and animal tissues. Literature on the subject has been reviewed by Reddy (1949).

Women generally feel tired and less energetic during menstruation. Animal tissues such as isolated muscle-nerve preparations, and plants have so far been employed for investigatory purposes. The present scheme of investigation is undertaken with a view to study whether muscular efficiency is altered in women during menstruation. Here, a group of young women have been chosen for investigation and the muscular performance during the various phases of the menstrual cycle worked out.

METHOD OF INVESTIGATION

When a muscle contracts isotonically and lifts a load, a part of the energy liberated is realised as external work. This is expressed as a product of the amplitude of the graph and the load. The total work done can be calculated and this is an objective method of study that can be utilised for assessing the efficiency of muscular contraction and the speed of onset of fatigue. The instrument employed is Mosso's ergograph. It is based upon the isotonic method and it

*Paper read before the Section of Physiology, Indian Science Congress, Lucknow, 1953.

records the maximal contraction of the flexors of the middle finger. The actual tracing—its form and nature—depends on the combined effects of the fatigue of the nerve centres and fatigue of the muscle, though the latter always predominates. Ergographic records were taken under the following standard conditions.

1. Girls belonging to the same age, height and weight group were chosen.

2. The investigations were carried out at the same hour of the day.

3. The weight employed with ergograph was kept constant.

4. Depth at which the weight hangs down from the edge of table is fixed.

5. The frequency of contraction is tuned to a metronome—50 per minute.

6. Distance from contraction fingers to edge of table is kept constant.

Two sets of tracings were obtained in each case—1. Midmenstrual phase and 2. Menstrual phase.

Procedure

The arm is placed in the supine position and fixed to a horizontal support. A leather ring is applied to the middle finger which carries a string that runs over a pulley and is weighted at the end. Contraction and relaxation is effected at the proximal interphalangeal joint. The rate of contraction is tuned to a frequency of 50 per minute (Howell, 1937).

Observations

Records and graphs of 20 young women are analysed and discussed in this paper. As can be seen from the graphs obtained the amplitude of contraction shows a decline on fatigue setting in.

The total work done in each case is calculated. On the basis of results the subjects—may be conveniently divided into three groups:

Group 1—Individuals who manifest more than 50 per cent decrease of muscular efficiency during menstruation.

Group 2—Individuals who show less than 50 per cent but more than 25 per cent decrease of muscular efficiency during menstruation.

Group 3—Individuals who manifest less than 25 per cent decrease of muscular efficiency during menstruation.

The data collected are presented in Table 1 and also in graphical form in Fig. 1.

Table 1—Showing Reduced Muscular Efficiency—Work Done in Kilogrammetres

Subject		*Midmenstrual interval*	*Menstrual phase*
GROUP I: REDUCTION MORE THAN 50 PER CENT			
1.	CJ	4·26	1·8
2.	MD	1·57	0·6
3.	PM	4·24	1·8
4.	KM	2·40	1·10
5.	ID	2·78	1·24
GROUP II: REDUCTION LESS THAN 50 PER CENT BUT MORE THAN 25 PER CENT			
1.	KTB	2·85	1·9
2.	TB	3·25	2·00
3.	RB	4·21	3·17
4.	NK	3·52	1·82
5.	SM	3·86	1·90
6.	PVS	2·75	1·89
7.	SK	4·12	3·10
8.	SJ	3·60	1·85
9.	SV	2·2	1·22
10.	AT	4·08	2·98
11.	SS	2·83	2·00
12.	MS	2·42	1·5
GROUP III: REDUCTION LESS THAN 25 PER CENT			
1.	TPS	8·53	6·55
2.	GNS	3·72	2·7
3.	VS	4·76	3·7

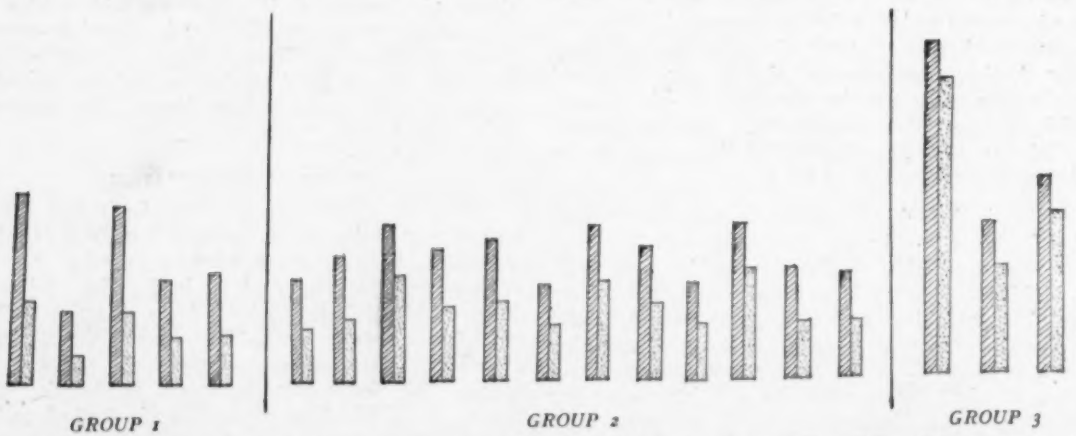

Fig. 1—Graphical Representation of Results. The Striped Area Represents Work Done During Intermenstrual Phase and the Stippled Area that During Menstruation

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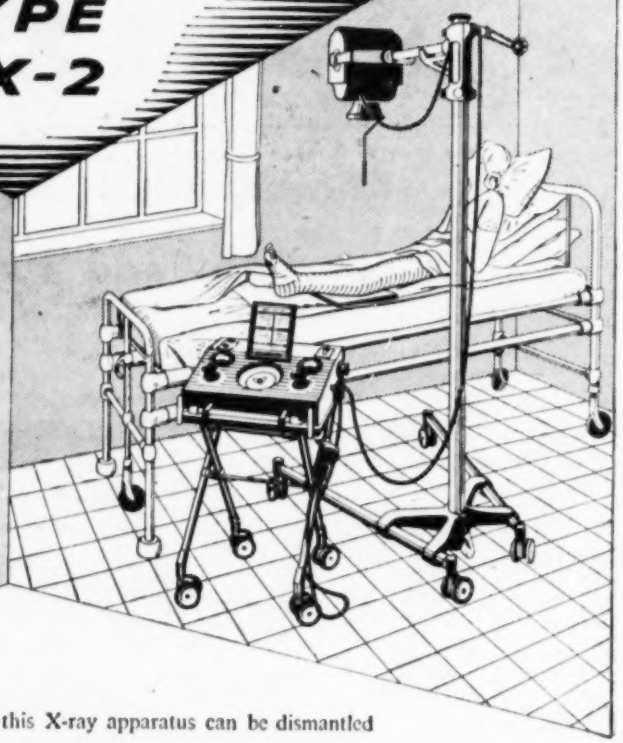

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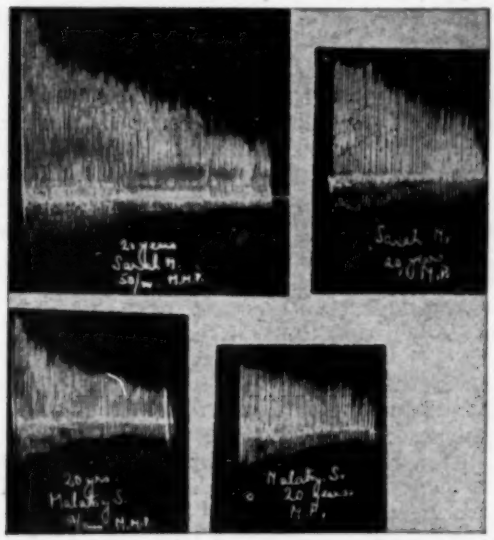

FIG. 2—ERGOGRAPHICAL TRACINGS OF TWO TYPICAL CASES (GROUP 2, NOS. 5 AND 6)

Results obtained reveal in this present set of investigations that the majority of the individuals belong to Group 2 wherein the muscular efficiency is decreased less than 50 per cent but more than 25 per cent during menstruation.

CONCLUSION

The above observations are presented as suggestive evidence that decreased muscular efficiency exists during menstruation. The capacity for work is considerably reduced during the menstrual phase. The onset of fatigue in the course of muscular activity is apparently hastened. The power of a muscle to perform work is diminished by conditions that depress the general nutritive state of the body or the local nutrition of the muscle itself e.g., conditions like loss of sleep, hunger, mental activity, muscular anaemia, metabolites, toxins and drugs. The idea that during menstruation a toxic substance is in circulation in the body of the woman has been gaining currency. Clinicians have supported the idea of a menotoxin to be the cause of the apparent exacerbation of the symptoms in various pathological conditions during the menstrual phase. Whether it is the toxin that is responsible for the lowered muscular efficiency during menstruation or whether the observed result is due to some disturbance in metabolism or endocrine factor related to the menstrual cycle is a problem yet to be studied. General agreement exists that carbohydrates are the energy yielding foods per excellence for muscular contraction and that they are absolutely necessary for enduring performance of hard work. Hence the question arises as to whether during the menstrual period there exists any alteration in carbohydrate metabolism under the influence of hormonal variations during the menstrual cycle which then account for the diminished muscular efficiency during the period. Bloech and Bergel (1947) are among those who hold the view that the menstrual cycle involves changes in carbohydrate metabolism. Their observations show that during the menstruation and premenstrual stages, a dextrose tolerance test is different from one made during the interval. It was noted that in diabetics, an impairmant of carbohydrate tolerance occurs during menstruation. Whether decreased muscular efficiency observed during the menstrual period is related to the alterations in carbohydrate metabolism is the present consideration. Macht (1949) has restudied the menstrual toxin and revealed that in nature it is related to steroid group of compounds. Hence whether the influence of hormones possessing similar structure could produce changes in the metabolic functions during menstruation is a possibility for consideration. Whether the actual concentrations or relative proportions of gonadotrophins and ovarian hormones have any bearing upon metabolic functions is a problem. The role of potassium ions on neuromuscular transmission is under consideration. These questions need further investigation, in order that one could assess definitely the relative role of various factors responsible for decreased muscular efficiency during menstruation.

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STREPTOCOCCAL ENZYMES IN COMBINATION WITH RECENT ANTIBIOTICS IN CHRONIC OTITIS MEDIA*

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HISTORY OF ENZYMES

The extracellular enzymes which are elaborated by hæmolytic streptococci have been studied qualitatively and quantitatively by Tillet *et al* (1938); and they have demonstrated how their biochemical, biophysical and biological reactions can be utilised for therapeutic purposes. The fibrinolytic principle was found much more frequently in broth cultures from hæmolytic strepto-

*Read at the 29th session of the All-India Medical Conference, Patna.

cocci than in culture media from any other organisms. Of 285 strains of Lancefield's Group A hæmolytic streptococci, 98 per cent were fibrinolytic; while Groups B, D, E, F and H were negative. Group C strains isolated from man tended to have fibrinolytic properties but Group C strains from animal sources usually did not. With Group G, 70 of 79 strains were found to be fibrinolytic. Very few other organisms produce enzymes which cause fibrinolysis comparable to that of streptococci. Milstone (1941) showed that the human serum factor, which was necessary for completion of streptococcal fibrinolytic activity, was present in the euglobin fraction of plasma proteins. These studies suggested that the enzyme from streptococci activated a precursor of a fibrinolytic factor in human serum, and Christensen (1945) therefore appropriately renamed the streptococcal enzyme as "streptokinase".

During investigation to find out possible therapeutic uses for streptokinase it was observed that the injection of crude concentrates of the enzyme could cause liquefaction of purulent exudates and blood clots. Sherry and Goeller (1950) found out that a nucleoprotein—desoxyribonucleoprotein—was responsible for the viscosity of purulent exudates. Sherry and Goeller (*loc. cit.*) demonstrated that an enzyme, which they called "streptodornase" was produced by streptococci and could catalyse the breakdown of desoxyribonucleoprotein.

Biochemistry of Enzymes

Streptokinase has maximal activity at pH 7·3 to pH 7·6; at pH 5·0 it is inactivated, but regains its activity if pH is increased; at pH 9·0 or higher it is irreversibly inactivated. During early trials in purification of streptokinase, a Group C strain of streptococci was isolated which proved to be an unusually potent producer of the fibrinolytic principle, streptokinase, but which caused minimal reactions upon intramuscular injection into human beings. This strain (H46A) has been used in the later development of streptokinase and streptodornase.

Besides being produced by Lancefield groups of streptococci, desoxyribonuclease (streptodornase) may be produced by other organisms, such as pneumococci, and desoxyribonuclease has been isolated and purified from beef pancreas (Kunitz, 1948).

Sherry and Goeller (*loc. cit.*) have shown that degradation process obtained with streptodornase appears to resemble that of acid hydrolysis. The component enzymes of streptodornase do not need the presence of a serum factor because all act directly upon their respective substrates in desoxyribonucleoprotien and successive breakdown products. Streptodornase acts only on extracellular nucleoprotien, or nuclei in degenerating cells; it does not attack the nuclei or nucleoprotein of living cells. This is the most important property when it is used as a biological curette as it does not interfere with the healthy tissue. Depolymerase activity occurs over a wide range of pH but is greatest between pH 7·0 and pH 8·5 and isooptimal about pH 7·5. Its activity is retarded if the temperature goes above 45°C. Substances like citrate and heparin inhibit the action of streptodornase.

Both streptokinase and streptodornase are antigenic substances capable of stimulating production of antienzymes. Mcfarlane and Pillang (1946) have worked on the factors and antienzymes in plasma which are responsible for fibrinolysis. Plasminogen is present in the globulin fraction and transformed by streptokinase into plasmin which in turn produce fibrinolysis.

Antiplasmin is found in the albumin fraction; it bears a loose relationship with plasmin, and can be readily dissociated from plasmin by fractionation or dilution. Ordinarily there is enough antiplasmin in combination with plasmin to prevent its action under normal situations, and alteration of the plasmin/antiplasmin balance determines presence or absence of fibrinolytic activity. After infection with streptococci or injection of streptokinase the body develops another factor "antistreptokinase", which is specific in inhibiting the streptokinase transformation of plasminogen to plasmin. Guest and associates (1948) and Lewis and Ferguson (1950) have studied the activity of antifibrinolysis in the plasma of various animal species and Kaplan (1946) has contrasted antifibrinolysin and antiprotease.

Present Study

The present work is taken up by the author to study the action of streptococcal enzymes on cases of chronic otitis media. As it has been observed that such cases having duration of months to years are mostly subjected to radical mastoidectomy or Schwartz operation. Results are so far not very hopeful. Those cases are surgeons' headache who lead miserable lives with foul smelling discharging sinuses in postoperative periods. The present cases were selected to observe the result of closed surgery with the help of streptococcal enzymes. Gould and Sherry report extremely satisfactory results from the use of streptokinase and streptodornase in 23 cases of chronic draining ear infections.

Before taking up the treatment patients were examined to see the conditions of the pharynx, throat, general health and whether some other diseases were associated with the ear condition or not. All cases showed practically the same condition of discharge from the ear, perforated membranes, mastoid tenderness and deafness. Fauces congested and glands were enlarged except in cases 1 and 9. Cases 3 and 7 were diabetic and syphilitic respectively. On microscopic examination of the pus of these cases streptococci and staphylococci were seen in large numbers.

Fourteen cases were divided into four groups. The first group consisting of six patients received enzymes only; second group of three patients was given aureomycin otic only; third group of three patients received terramycin otic and fourth group of two patients was treated by mercurochrome-spirit drop (10 per cent).

The summary of the work is given in Table 1.

TABLE I

Group No.	Case No.	Name, age and history of patient	Physical and other findings	Drug used	Result	Remarks
Group I.	1	M. M., 29 yrs. Discharge and pain in the rt. ear and deafness for 11 yrs.	Drum absent. Mastoid tenderness. Nerve conduction nil. Bone conduction present. Other systems normal.	14,000 units Streptokinase and 2,500 units Streptodornase locally for 3 days	Discharge reduced after 4th day but continued as such. Terramycin otic given	Discharge stopped after 7 days. Deafness persisted
	2	K. S., 20 yrs. Discharge from the rt. ear and deafness for 6 yrs.	ditto	ditto	After 4th day discharge stopped	Mastoid tenderness passed off after 10th day
	3	S. D., 45 yrs. Discharge from the rt. ear for 1 month. Slight deafness. Buzzing sound in both ears	Drum perforated; serous discharge from rt. ear. Nerve and bone condition ++ Sugar in urine ++ Other systems normal	ditto	Serous discharge reduced by 12th day but did not stop	Aureomycin otic given but discharge continued. Terramycin otic given for 14 days—no improvement
	4	P. P., 35 yrs. Discharge and pain in lt. ear, 7 yrs.	Drum perforated; other findings as in Case 1.	ditto	After a week discharge stopped	Mastoid tenderness and pain in the ear not complained of after the course of treatment
	5	P. M., 16 yrs. Discharge from rt. ear 5 yrs. Pain behind the ear 1 yr. Deafness 5 yrs.	As in Case 1	ditto	After 6th day discharge stopped	Pain subsided. No improvement in deafness
	6	K.P., 12 yrs. Painful swelling behind the rt. ear 7 days. Discharge from the rt. ear of 7 yrs. duration stopped 1 year back	Drum perforated; marked tenderness over the swelling which is extending from the mastoid process to rt. temple. Rt. pinna deviated outwardly. Other systems normal.	Two applications given as above	No improvement	Four applications of Varidase given into the mastoid region on alternate days. Discharge stopped and pain subsided by 15th day. Slight mastoid tenderness noticed till this period

TABLE I (*contd.*)

Group No.	*Case No.*	*Name, age and history of patient*	*Physical and other findings*	*Drug used*	*Result*	*Remarks*
Group 2	7	K.R., 24 yrs. Foul smelling discharge from the rt. ear for 3 yrs. Deafness 3 yrs.	Purulent discharge from rt. ear. Other conditions as in Case 1. W. R. + + +	Aureomycin hydrochloride 50 mgm. dissolved in 10 c.c. of the diluent. 3 drops 3 times a day for 6 days	From 5th day discharge reduced. It did not stop	Another course of aureomycin otic given for 5 days. No improvement. Varidase given as in Group 1. Afterwards terramycin otic instilled for 7 days. Discharge stopped but relapse occurred. No antisyphilitic treatment given
	8	K. C. R. A., 38 yrs. Discharge from the rt. ear and deafness for 4 yrs. Pain behind the rt. ear 1 yr.	Mucopurulent discharge from rt. ear. Tenderness over mastoid region. Drum perforated. Other systems normal	ditto	ditto	Combined therapy of Varidase and terramycin otic given as in Case 7. Discharge stopped but no improvement in deafness
	9	S. P., 20 yrs. Discharge from lt. ear 11 yrs. Deafness 11 yrs.	As in Case 1	ditto	ditto	ditto
	10	P. K., 22 yrs. Discharge from rt. ear 6 yrs. Pain in rt. ear and deafness 6 yrs.	ditto	Terramycin HCl. 25 mgm. dissolved in 5 c.c. solvent. 3 drops 3 times a day in the ear for 7 days	After 6th day discharge stopped. No relapse	No relapse seen after a month's follow-up
Group 3	11	S. N., 16 yrs. Discharge from rt. ear 3 yrs. Pain in the ear 6 months. Deafness 3 yrs.	As in Case 8	ditto	Discharge stopped but relapse occurred	Combined therapy given as in Gr. 2. Discharge stopped. Pain subsided. No relapse. No improvement in deafness
	12	W. V. R., 23 yrs. Discharge from both ears 5 yrs. Pain and swelling behind lt. ear 1 yr. Deafness 5 yrs.	As in Case 6 except that the swelling was extending over the mastoid region only on lt. side	ditto	ditto	ditto
Group 4	13	R. K., 28 yrs. Discharge from lt. ear 1 yr. Pain in the ear.	Purulent discharge from lt. ear. Drum perforated. Other systems normal	Mercurochrome-spirit ear drop 10 per cent; 4 drops 2 times a day for 7 days	No marked improvement noticed	
	14	S. K. C., 12 yrs. Discharge from the rt. ear 8 months.	Mucopurulent discharge from rt. ear. Other systems normal	ditto	After 7th day discharge stopped completely	Relapse occurred after treatment was stopped

Group 1—To six patients enzymes [Varidase brand supplied by M/s. Lederle Lab. (India), Ltd.] were applied locally by instilling 2 c.c. of enzymes solution (containing 14,000 units streptokinase and 2,500 units streptodornase) while patients lay keeping the diseased ear uppermost. They were kept in this position for 4 hours to keep enzymes in contact with the diseased area. Each patient received three treatments with Varidase instilled on alternate days, except Case 1 as he was attending the clinics at irregular intervals. Case 6 received six treatments as first two applications were not given at the appropriate site. On examination of this patient a mastoid abscess was observed on the right side. For the first two days Varidase was instilled into the ear with the idea of breaking the seal which caused the blocking of the pus in the mastoid region. Having failed in this attempt four injections of 14,000 units streptokinase and 2,500 units streptodornase in 2 c.c. isotonic normal saline were given into the mastoid region. Each injection was given on alternate days. Next day the swelling around the pinna was markedly reduced. Henceforth the rate of cure was judged by the lessening of the degree of outward deviation of the pinna and the degree of tenderness over the mastoid region. On the third day an œdematous swelling was noticed over the zygoma and the upper eye lid. It might be due to the reaction produced by Varidase. This swelling gradually subsided by the fourth day. On the second day a drainage tube was pushed inside the abscess cavity four hours after the administration of the enzyme solution giving a small incision behind the pinna. In this way the drainage was maintained for five days. On the 6th day very little thin serous discharge was seen in the dressing in comparison to the second day when there was profuse discharge of serosanguinous character. By the 8th day the discharge from the wound appeared very little in quantity; tenderness was markedly reduced and pinna came to its normal position. By the 15th day pain and tenderness were completely absent. The case could not be followed further as the patient did not turn up after the last examination, i.e., on 15th day.

Other five patients were treated by Varidase locally. All of them complained of pain and itching in the ear after the application of enzymes. On the second day the character of the pus changed; it became thin serous so it appeared to patients as if the discharge increased in quantity. The discharge continued for 3-4 days in these cases. After the fourth day it completely stopped in Cases 2, 4 and 5; slight tenderness was there over the mastoid region for about a week; by about the 10th day it passed off.

In Case 1 who had an irregular course of Varidase the discharge was noticed only in the first swabbing of the ear after the 4th day. When there was discharge for about a fortnight and no further improvement was seen, the patient was subjected to terramycin otic to observe the result of combined therapy of Varidase-Antibiotic ear drop. Terramycin otic (25 mgm. of terramycin hydrochloride dissolved in 5 c.c. of the solvent) was instilled 3 drops 3 times a day for 7 days. The discharge stopped completely after this course of treatment. The failure of enzyme therapy in this case may be attributed to irregularity of the treatment as the patient was attending the clinic after an interval of four or five days for each treatment and thus the enzyme solution could not be used at regular intervals to maintain the proper concentration and the contact with the substrate.

In Case 3 little serous discharge was observed till the 12th day. His urine was all along free from sugar during the period of treatment as he was kept under dietetic control. After the 12th day finding no further change in the condition of the ear, aureomycin otic (50 mgm. aureomycin hydrochloride dissolved in 10 c.c. of the solvent) was given locally for eight days (3 drops four times a day). The discharge continued as usual so it was replaced by terramycin otic after the 8th day which was given as in Case 1. After the 7th day the discharge stopped completely and no tenderness was there over the mastoid region.

When the above cases were followed for a month they showed uneventful recovery. The relapse was noticed in Case 3 (diabetic) after a week and so terramycin otic was again started in the same strength but the discharge did not stop even after a course of ten days. Other cases were followed for two months but none showed any relapse during this period.

Group 2—Patients of this group were treated with aureomycin otic for six days in the same strength as used previously. On the third lay the consistency of the pus changed from thick purulent or mucopurulent to serosanguinous in all the three cases. From the 5th day onwards the discharge was reduced in quantity and became thin watery, but continued for 15 days; so another course was given for 5 days. In Case 7 the discharge stopped but relapse was noticed after about a fortnight; whereas in Cases 8 and 9 the thin watery discharge continued even after the course so they were put under 'combined therapy' with Case 7.

Group 3—To three patients terramycin otic was given locally for 7 days in the same strength as used previously. The character of the pus changed on the second day; it became thin serous in all cases. From 6th day onwards the discharge stopped in these cases. No marked improvement was observed in tenderness and swelling around the mastoid region in these cases. After 7 to 15 days relapses were seen in Cases 11 and 12 whereas Case 10 showed definite cure and no relapse was noticed after a month's follow-up.

COMBINED THERAPY: These cases (11 and 12) were treated with cases of Group 2 in a way similar to that described for Cases 1 and 3, i.e after the three enzyme applications terramycin otic was administered for 7 days in the same strength as described for Group 3. The result of combined therapy was remarkable as after a week the discharge stopped in all cases.

Mastoid swellings were appreciably reduced and the tenderness was totally absent in Cases 8, 9, 11 and 12. Case 7 complained of persistence of tenderness. The cases were followed for a month.

The relapse occurred in Case 7 whereas other cases showed uneventful recovery. In Case 7 no antisyphilitic treatment was given, hence the relapse may be explained in that light.

Group 4—Two patients were treated with mercurochrome-spirit drop (10 per cent) twice a day. The discharge was the same in character as before in both cases. After the 7th day Case 14 showed improvement as the discharge stopped; but it continued after about ten days. No improvement was noticed in mastoid swelling and tenderness.

Discussion

The use of enzymatic debridement in the treatment of suppurative infections within closed spaces has a special value as it does not interfere with the normal structures of tissues; there is no danger of open wound hazards and it serves as a tool for removal of coagulam and purulent exudates and thereby facilitates action of antimicrobial forces and hastens the normal processes of repair.

We have to judge clinically the special conditions that may be presented by individual cases regarding individual points in treatment, such as dosage, repetition of treatment, most favourable methods of application and evaluation of effects.

Some of the factors to be considered when evaluating therapeutic progress are:

(1) Were suitable cases selected for Sk-Sd. enzymes therapy? (2) Was a favourable concentration of enzymes maintained *in situ*? (3) Had the enzyme solution been used at the most appropriate site or sites? (4) Was contact maintained between enzymes and substrate adequately? (5) Was aspiration or drainage done at proper intervals? (6) Was supplementary antibiotic administration appropriate and adequate? (7) Has the enzymes action revealed or defined the need for other therapeutic measures?

Case 3 being in the early stage was not suitable as the inflammation was not in a chronic stage to cause nécrosis of the tissues. The enzymatic debridement was not required in this case. Antibiotics locally would have been sufficient to bring about cure.

Factors (2) and (4) reveal causes of failure of enzymes therapy in Case 1. The favourable concentration of the enzymes as well as the contact of enzymes and substrate could not be maintained because of irregular administration of enzymes though the case was most suitable for such treatment.

In Case 6 the first site—per aural—was inappropriate because of inaccessible loculations and interfering fibrous tissues so two applications of enzymes did not prove to be effective. The solution ought to be injected direct into the mastoid cavity to get the enzymes into close approximation to the diseased site.

Best results will be achieved if after enzymes application subsequent drainage of breakdown products and residual irritants is complete. In Case 6 the choice of open drainage was made as it is perfect whereas in other cases middle and external ears provided the free passage for draining the breakdown products. There is close relationship between the time for initial aspiration or drainage to the size of the space. The drainage of the mastoid abscess in Case 6 was done 5 hours after the use of Varidase whereas in other cases of combined therapy drainage was maintained 4 hours after the administration of enzymes.

Combined therapy group showed that there were definite need for antibiotics. When the curettage of the diseased area was complete antibiotics were necessary to prevent further growth of pathogenic organisms on the exposed tissues.

Summary

(1) A brief history of the development of streptococcal enzymes is given.

(2) A trial of streptokinase and streptodornase enzymes was given by the author in six cases of chronic otitis media. Eight cases were treated with antibiotics otic and mercurochrome ear drop for comparison of therapeutic results and as controls.

(3) Four cases out of six showed definite cure in enzymes therapy group; the remaining two cases did not respond well for some reasons mentioned above and so they were given combined therapy of enzymes (Varidase)-antibiotics locally with good results in one case.

(4) Three cases were treated with aureomycin otic showed some improvement for a certain length of time. One case was completely cured but relapse followed soon; in other cases symptoms persisted after little improvement in the beginning.

(5) The group of three cases treated with terramycin otic had improvement earlier in comparison to aureomycin group. All cases showed definite cure. The relapse was seen in two cases.

(6) Two patients treated with mercurochrome-spirit drop did not show any marked improvement in their conditions.

(7) Combined therapy of Varidase-antibiotics was given to those patients who did not respond well to antibiotics otic alone or enzymes (Varidase) therapy. Seven cases received this treatment. Except two cases all showed definite cure in their conditions. No relapse was noticed in these cases.

Conclusion

Trials are to be given on more cases of chronic otitis till a definite opinion can be given on the efficacy

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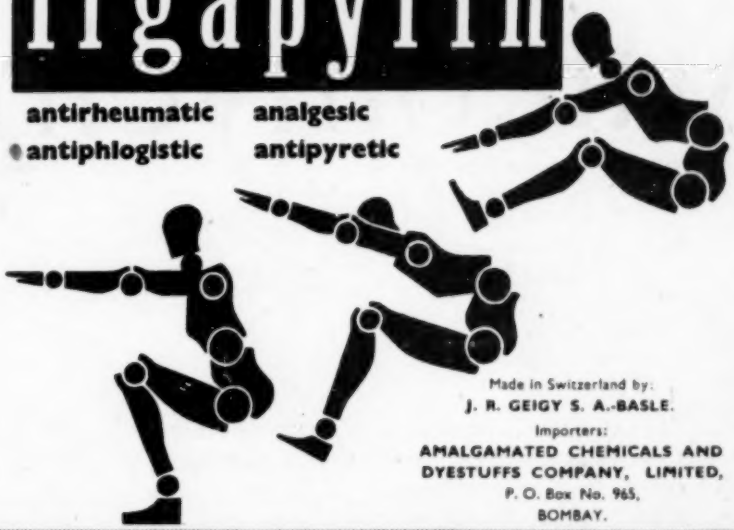

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of the streptococcal enzymes as a biological curette. From the present study it may be said that enzymes in combination with antibiotics would definitely change the grave outlook of such cases to a great extent.

ACKNOWLEDGMENT

I am thankful for this work to M/s. Lederle Laboratories (India) Ltd. for supplying Varidase and Aureomycin otic and M/s. Chas. Pfizer and Co. and their distributors M/s. Dey's Medical Stores, Ltd., Calcutta, for supplying Terramycin otic.

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PRACTITIONERS' CORNER

THE DIAGNOSIS OF SARCOIDOSIS

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In recent years new light has been thrown on the subject of sarcoidosis although it is disappointing to note that there has been very little advancement in the elucidation of its aetiology.

AETIOLOGY

Aetiology is uncertain—some say that it is tuberculous in origin but the relationship to the tubercle bacilli has never been definitely proved; others believe it to be due to an unidentified virus infection. Of course there is, as yet no confirmation of either theory. Professor Cameron suggests that sarcoidosis is of the nature of a non-caseating blood-borne chronic miliary tuberculosis occurring in persons with high immunity and low sensitivity. It is a disease affecting both sexes, occurring commonly in middle age between 20—40 years. It is rare in the very young or very old but cases have been reported in patients of 2 months, 6 years and 80 years. The distribution is wide amongst white-skinned people but no race is exempt.

It is believed to be a non-caseating granuloma involving lungs, lymph nodes, bones, skin, eyes, parotid glands, thyroid glands, lacrymal glands, submaxillary glands, liver, spleen and kidneys. Brain and heart are sometimes involved.

PATHOLOGICAL CHANGES

A histological section of a sarcoid tubercle shows giant cells, epitheloid cells and lymphocytes with considerable fibrosis and hyaline degeneration but no caseation. No tubercle bacilli are found. In the majority of cases, the Mantoux reaction is negative although a weakly positive tuberculin test does not exclude sarcoidosis but a strongly positive reaction is against it. A positive skin reaction is shown with Kweim antigen. Essentially, the disease differs from tuberculosis in that the Mantoux reaction is negative and there is no response in the guineapig after the injection of sarcoid tissue, no caseation and there is failure to culture tubercle bacilli from the sputum. The blood picture is normal except that it may show a moderate degree of mononucleosis. A few cases show eosinophilia and slight increase in serum calcium and phosphatase. Hyperglobulinaemia with reversal of the albumin-globulin ratio may be commonly noticed.

RADIOLOGICAL AND CLINICAL FINDINGS

X-ray of the Chest—Pulmonary changes are so common that it should be a routine procedure to make an x-ray examination in all cases of suspected sarcoidosis. In cases where no positive findings are noted, the examination should be repeated a few weeks later. The main pulmonary changes are (1) increased hilar shadows suggesting glandular enlargement with or without pulmonary infiltration, (2) mottled opacities in both lung fields and (3) diffuse interstitial fibrosis of the lungs. Any of these changes or a combination of any of these is present in majority of cases. The majority of cases show bilateral hilar and right paratracheal lymph node enlargement. The miliary type is found in the minority of cases in the early stages. Tomography may be necessary to confirm the presence of enlarged mediastinal glands.

X-ray of Bones—The bones affected are the metacarpals, metatarsals and most frequently the phalanges of the hands and feet but the disease may affect the long bones. The x-ray film shows (1) translucent area or areas without any expansion of bone due to granulomatous invasion of the bone marrow, (2) diffuse mottling of bone with slight expansion or (3) porotic changes i.e., loss of bone density without any change of bone contour. Bone changes are present in 20 per cent of cases of sarcoidosis.

Parotid glands—There may be a painless nodular swelling of parotid glands with dryness of the mouth due to diminution of parotid saliva. A painless swelling of the parotid glands associated with inflammation of the uveal tract (uveo-parotid syndrome) is suggestive of sarcoidosis. In about 50 per cent of cases of uveo-parotid syndrome there is facial paralysis on one or both sides. A sialogram will show patency of parotid ducts.

Central Nervous System—Involvement of the central nervous system in sarcoidosis is uncommon but has been reported on several occasions. It may exist in the form of a space-occupying granulomata or posterior arachnoiditis and is often diagnosed as a cerebral

tumour or no diagnosis is made during life. A few cases of pituitary involvement have been reported with minimal signs elsewhere in the body and the diagnosis has been made only at necropsy. Peripheral nerves may show infiltration with sarcoid tissue as described by Mazza in 1908.

Lymph Nodes—Enlargement of the lymph nodes may be general, slight in some nodes and marked in others, simulating reticulosis. Biopsy is necessary to establish diagnosis. The enlargement of the peribronchial glands is a common feature on a radiogram of the chest. If the regional glands are involved they become fibrotic. Lacrymal gland involvement is associated with lesion on the skin of the eyelid.

Ocular Manifestations—Present in 10 per cent of cases. Iritis, iridocyclitis conjunctivitis, choroidoretinitis, optic neuritis are common; vitreous haemorrhage, glaucoma and cataract may develop.

Skin changes—The disease manifests itself as painless nodular infiltrations small or large, which do not break down on pressure; or bluish-red or purplish indurated erythema; or scaling and thickening of the skin on the face, arms, forearms or trunk. The mucous membrane of the nose, pharynx, larynx and mouth may be affected. Cutaneous lesions are present in 40 per cent of cases.

Visceral manifestations—The liver and spleen are frequently affected but not commonly enlarged. Some believe that Crohn's disease is a manifestation of intestinal sarcoidosis. The kidneys, heart and stomach may be affected.

Diagnosis

Diagnosis of sarcoidosis depends primarily on the histological findings. Biopsy of the skin nodule, lymph node, parotid swelling or bone will confirm the diagnosis.

An x-ray examination of the chest and bones of hands and feet may reveal the characteristic changes in lungs, mediastinum and bones.

The Mantoux test is negative or weakly positive.

The Wassermann and Kahn reactions are negative.

Acid-fast stain of the sputum is negative.

The guineapig inoculation test is negative.

The Kweim antigen gives positive skin reaction.

Moderate doses of radiation produce no response.

The E.S.R., serum protein (A-G ratio is reversed), blood count total and differential should be performed.

Liver biopsy, sternal marrow count, electro-encephalogram and ventriculogram may be made.

The diagnosis of sarcoidosis is established by histological examination in conjunction with clinical, bacteriological and radiographic examinations.

Lesions resembling Sarcoidosis in Skiagram—Differential diagnosis of pulmonary sarcoidosis requires consideration of so many lesions that it is rather impossible to discuss all in one x-ray examination. Broadly they may be divided as follows:

1. Nodular pulmonary disease—pneumoconiosis, leukaemia, eosinophilia, bronchopneumonia, virus pneumonia, chronic passive venous congestion and periarteritis nodosa.

2. Miliary pulmonary disease—miliary tuberculosis, miliary carcinomatosis, actinomycosis and other mycotic infections.

3. Fibrotic pulmonary disease—chronic fibroid phthisis, paragonimiasis, radiation pneumonitis.

4. Mediastinal and hilar diseases—Hodgkin's disease, lymphosarcoma, aneurysmal dilatation of pulmonary arteries, bronchial neoplasm (central type).

Acknowledgment

I should like to express my sincere thanks to Dr. Norah Walker, Consultant Radiologist, United Liverpool Hospitals and Assistant Lecturer in Radiology, Liverpool University, for her valuable comments, to Drs. S. Dutta, M.D., Visiting physician, H. K. Chatterjee, Vice-Principal of the R. G. Kar Medical College and Hospitals and Sibaprasad Chatterjee, Calcutta, for kind assistance.

CASE NOTES

NORTH AMERICAN BLASTOMYCOSIS

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North American blastomycosis is a chronic granulomatous lesion of the skin or viscera caused by *Blastomyces dermatitidis*. The disease was first described by Gilchrist in 1894 and by Gilchrist and Stokes in 1896. It should be distinguished from 'blastomycosis' described in the European literature to mean cryptococcosis or European blastomycosis caused by *Cryptococcus neoformans*. Except for occasional cases in England, Canada and other countries, most cases of North American blastomycosis have been confined within the borders of United States. In a series of 347 cases collected by Martin and Smith more 50 per cent cases occurred between the ages of 20 and 40 and males were infected nine times as frequently as females. The disease is more common in lower economic groups and in those who come in contact with soil and vegetation. All races are susceptible. The source of infection in nature has not been determined. The disease is not readily contagious from man to man.

Clinically, two types of the disease are described:

(1) *Cutaneous blastomycosis*—Here typical granulomatous skin patches appear on the skin. The subjective symptoms are mild. The regional lymph glands are not enlarged. The general health is not impaired

Fig. 1—Showing bilateral hilar glandular enlargement typical of sarcoid

BANERJEE— *The Diagnosis of Sarcoidosis (pp. 21-22)*

Fig. 4—Showing blastomyces dermatitidis in pus (× 250 approx.)

MUKHERJI— *North American Blastomycosis (pp. 22-24)*

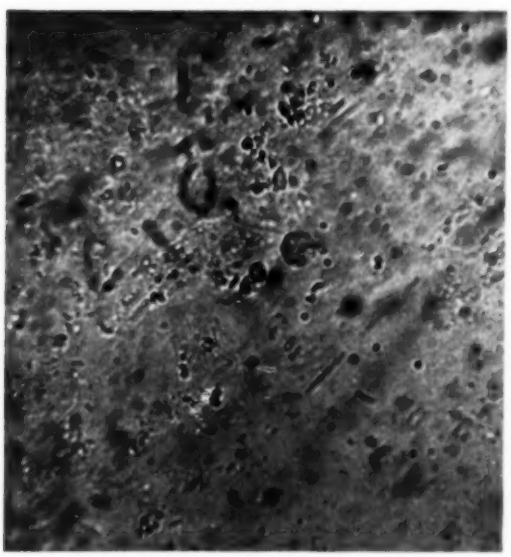

Fig. 2—Showing blastomyces dermatitidis in pus (× 500 approx.)

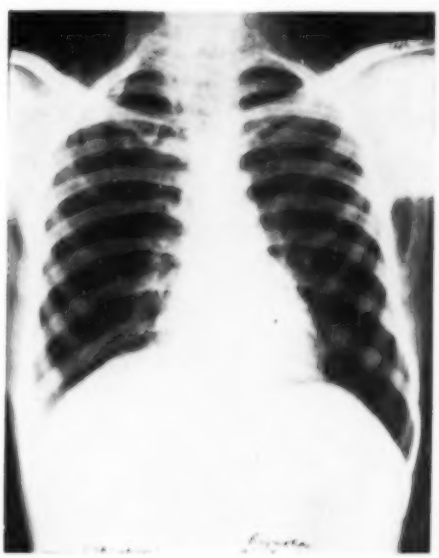

Fig. 3—Skiagram showing the circumscribed area of destruction of the right clavicle with little reaction

MUKHERJI— *North American Blastomycosis (pp. 22-24)*

Fig. 1—Photomicrograph of heart showing amyloid in media of arteries

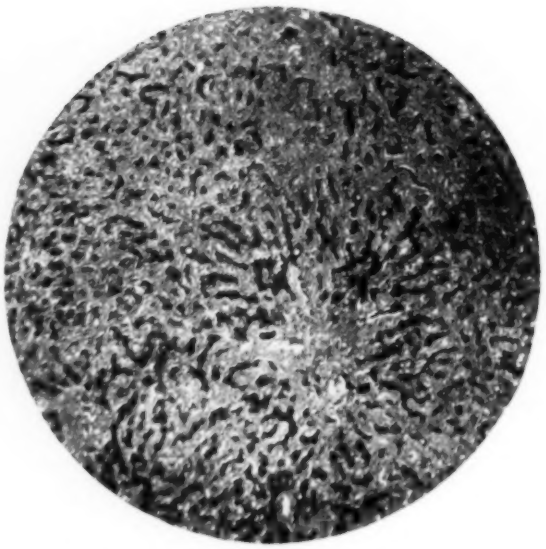

Fig. 2—Photomicrograph of liver showing extensive deposition of amyloid

Fig. 3—Photomicrograph of the prostate showing amyloid in media of arteries

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unless there is systemic involvement which may, however occur at any time during the course of cutaneous blastomycosis.

(2) *Systemic blastomycosis*—Here the respiratory tract is the usual portal of entry and the lungs are infected in most of the cases. Bones particularly the ribs and vertebrae and viscera like liver, spleen and kidneys are also commonly infected. Infection may also occur in the central nervous system, prostate and intestinal tract. The disease starts insidiously often with dry cough, pain in the chest low grade fever and breathlessness. After a period of weeks or months, the dyspnoea increases, the fever gets higher and there is progressive weakness and loss of strength. Other mediastinal structures may be invaded and then the symptoms referable to involvement of these organs appear.

Skiagraphy of chest may show slight or moderate enlargement of mediastinal lymph nodes and often there are dense masses irregular in outline with a tendency to fan out from the hilum. Cavities when present are small and have irregular hazy outlines. Rarely, the picture may be that of miliary tuberculosis. The bone lesions when present are less proliferative than those of actinomycosis. The diagnosis is confirmed by detection of the double-contoured, budding, yeast-like organisms on examination in 10 per cent sodium hydroxide of the pus squeezed from miliary abscesses in cutaneous lesions. Sputum and other exudates should be examined in the same manner for the blastomyces. The organism can be grown readily in Sabouraud's medium or meat infusion blood agar. A skin test to blastomyces vaccine becomes positive in the more extensive skin cases and in almost all the systemic cases. A complement fixation test has been used by Martin. The test is usually positive in the progressive cases. Some non-specific findings are increased erythrocyte sedimentation rate, hypochromic anaemia and leucocytosis with an increase of neutrophils.

The patient should be tested for hypersensitivity by intradermal injection of standardized blastomyces vaccine. If positive, desensitization should be performed by subcutaneous injection of gradually increasing doses of the vaccine. Iodide therapy is indicated thereafter starting with a small dose and then gradually increasing it. X-ray therapy is very effective in cutaneous blastomycosis which should be done after desensitization and iodide therapy. Surgical procedures may be of value when large foci of infection can be drained. The prognosis is usually good in localised cutaneous lesions which are often cured if properly treated. The prognosis is poor in systemic blastomycosis. The prognosis is best in patients with positive skin tests and no demonstrable antibodies in the serum.

Case Report

A coal-cutter aged 25 thin and of extremely poor general health was admitted in the hospital on 23-10-51 for generalised skin eruptions all over the body lasting for two months. These eruptions started as papules and slowly spread by peripheral extension. For the same period he was having a cough with mucoid expectoration and loose watery motions usually twice or thrice a day. He also complained of a dull continuous pain over the right upper abdomen which was only of a week's duration.

On examination, the patient was pale, weak and emaciated. There were numerous circular patches on the skin usually varying from 1/2 to 1" in diameter all over the body. The patches were more numerous on the face and limbs while those on the trunk appeared to be in a healing stage. They were sharply defined from the surrounding skin. The margins were abruptly elevated, dark red and contained numerous small abscesses usually of the size of pinheads. The central portion of the patches was white and covered with a fine scar. The patches on the face looked like irregular granulomatous elevations raised from the surface. There was no pain or tenderness but occasional slight itchings were there. The temperature was 100·6°F. Pulse—92 per minute, soft and feeble. Respiration—32 per minute. Tongue—moist and coated. A hard tender mass continuous with the liver was present in the right hypochondrium. The right rectus was rigid. The upper level of the liver dullness was not altered. Spleen—not palpable. Rales and rhonchi were present all over both the lungs; a haemic murmur was present on the precordium. There was no rigidity of the neck; jerks and reflexes were sluggish; plantar reflex was of the flexor type; Kernig's sign was negative. Lymph glands were not enlarged.

Pus squeezed from the miliary abscesses in the cutaneous lesions (as well as the scrapings from these lesions) examined in 10 per cent sodium hydroxide revealed the double-contoured budding yeast-like organisms (Figs. 1 and 2, *vide* Plate). This was done several times during the course of illness and every time the organisms were detected on careful examination. An attempt to grow the organisms in blood agar and minced meat broth under conditions of limited facilities was not successful.

Blood: Hb. 36 per cent (Hellige); R.B.C. 2,100,000 per c.mm.; W.B.C. 4600 per c.mm.; polymorphs 81 per cent; lymphocytes 16 per cent; eosinophils 2 per cent; myelocytes 1 per cent; E.S.R. 150 mm. in the 1st hour (Westergren); blood W.R. and Kahn test—negative. Sputum: acid fast bacillus or blastomyces not found. Stool: hookworm ova, entamoeba histolytica cysts, blastocysts, chilomastix mesnili and degenerated pus cells; test for occult blood positive. Urine: moderate amounts of albumen and traces of bile pigments and bile salts. Cerebrospinal fluid: No abnormality detected. Skiagraphy of the chest: a sharply circumscribed area of destruction at the medial end of the right clavicle with little reaction in the surrounding area (Fig. 3, *vide* Plate). The skin test with

blastomyces vaccine and complement fixation test could not be performed due to want of facilities.

Progress of the Case—The patient was running an irregular temperature usually not rising more than 101°F. He was treated with local application of lotio calamine with 1 per cent gentian violet over the skin eruptions. Emetine gr. 1 was injected daily for six days and then with 5 days interval another 3 grs. were injected in 3 days. Procaine penicillin 4,00,000 units were injected I. M. once daily. Potassium iodide was administered starting with a small dose of grs. 2 twice daily and then the dose was gradually increased. Sedative expectorants, iron in small doses, vitamins and enterovioform tablets were also given.

Later on, during the course of illness, cibazol (one tablet 5 times daily) and sulfaguanidine tablets (2 tablets 5 times daily) were administered for some days. With all these the condition of the patient was no better and he was progressively getting worse. The mass in the right hypochondrium gradually increased in size ultimately occupying almost half of the abdomen. Aspiration of this mass—diagnosed as liver abscess—was not done as the condition of the patient was very poor. Adventitious sounds were present all along all over the chest. The stools were thicker but not formed. An icteric tinge was noticed in the eyes. The respiration rate increased to more than 40 per minute. The skin conditions, however, definitely improved and some patches on the chest healed up almost completely.

On 7-11-51 the total W.B.C. was 12900 per c.mm. with polymorphs 87 per cent. Stool examinations repeatedly done after 7-11-51 did not reveal any ova or cyst and the test for occult blood was always fairly strongly positive. Urine all along showed presence of moderate amounts of albumen and bile pigments and bile salts. The patient ultimately died from progressive emaciation on 18-11-51. Post-mortem examination was not allowed.

Discussion

The diagnosis was North American blastomycosis infecting both skin and viscera. Associated with this were chronic amoebiasis, hook worm infestation and anaemia.

The diagnosis of cutaneous blastomycosis was confirmed by repeated detection of double-contoured budding yeast-like organisms in the pus and in the scrapings of cutaneous lesions. Sharply defined skin patches with abruptly elevated dark red edges containing numerous pin-head abscesses and a healing central portion covered with a fine scar is also fairly characteristic of the disease.

The systemic involvement of blastomycotic infection is confirmed by the sharply circumscribed area of destruction in the right clavicle with little reaction in the surrounding areas. A liver abscess showing no improvement with adequate doses of emetine and penicillin might be blastomycotic in origin. Loose motions throughout the illness not responding to emetine, sulfaguanidine, enterovioform tablets and other medicines, presence of moderate amounts of albumen in the urine throughout the illness and presence of persistent adventitious sounds in the lungs raises the possibility of blastomycotic infection of intestine, kidneys and lungs.

In the differential diagnosis the following diseases were particularly considered and differentiated as follows:

(1) South American blastomycosis where the most characteristic single clinical feature is enlargement of lymph glands. The mycologic diagnosis is established by demonstrating the multiple budding.

(2) Coccidiodomycosis where the spherules are found to contain numerous endospores. The fungus reproduces by means of these endospores which are freed by rupture of the wall. There is no budding.

(3) Cryptococcosis where large gelatinous capsules are seen round the budding yeast-like cells detected from the skin lesions. This fungus also has a marked predilection for the meninges.

Summary

A case of North American blastomycosis has been reported. It was both cutaneous and systemic in type. The case died after an illness of 12 weeks.

North American blastomycosis has been described in short.

Acknowledgment

I wish to express my thanks to Dr. G. C. Sen, Chief Surgical Officer, Sanctoria Hospital, for permission to publish the case; to Captain S. K. Ghose and Sri S. P. Gupta for the laboratory investigations and to Mr. Maitra and Mr. Rao of Digwadih Fuel Research Institute for the photomicrographs.

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PRIMARY SYSTEMIC AMYLOIDOSIS

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AND
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Although the existence of amyloidosis has been known for close on hundred years (it was first described by Wilksin in 1856), its exact pathogenesis and the true chemical nature of amyloid is still far from clear. In the light of observations during the last twenty-five years, however, at least four clinical types have taken shape:

(i) Secondary amyloidosis: the classical type which is associated with long-standing inflammatory lesions particularly tuberculosis of lungs, bones and joints, prolonged suppuration with discharge of pus from the body, syphilitic lesions especially breaking down gummata, etc.

(ii) Primary systemic amyloidosis.

(iii) Localised amyloid tumours: distinctly rare.

(iv) Amyloidosis which may accompany the rather uncommon disease, multiple myelomatosis.

The features that have been claimed to differentiate primary from secondary amyloidosis are absence of any known aetiological antecedent, involvement of tissues of mesenchymal origin (muscles of the heart, tongue and gastrointestinal tract, and media of small blood vessels being particularly affected) and atypical and variable reaction to special stains like iodine, metachromatic dyes and congo red. Primary amyloidosis is being reported with increasing frequency during the last few years. Even so, this interesting condition producing diverse symptoms and signs depending upon the degree and extent of involvement of different organs, is considered to be an infrequent occurrence. Of a total of 81 cases published to date, 3 have been reported from India (Eisen, 1946; Baker *et al*, 1949; De Wilf and Clarke 1950; Goldberg, 1950; Mangalik, 1950; Parker *et al*, 1950; Wahi, 1950; Waddington, 1953). An interesting case of amyloidosis is reported below:

Case Report

N. K., aged 36 years, male was admitted into the Medical College Hospitals on 2-12-52 in a very low condition. His only complaint was that for some time past he had gradually increasing weakness and a slowly developing mass in the right side of the abdomen. A few days prior to admission weakness had become extreme. Before the onset of this sense of weakness, he had suffered occasionally from bouts of fever, clinically diagnosed and treated as malaria. He gave no past history of jaundice. On admission, patient was anaemic and had generalised anasarca. There was no jaundice. He was afebrile, pulse rate was 100 p.m.; B.PP.—90/70 mm. Hg. There were no significant clinical findings in the heart. Examination of the lungs revealed crepitations in right infra-axillary area. The liver could be felt 4 fingers below the costal margin; it was hard, nodular and slightly tender. The spleen could be felt 7 fingers below the costal margin and was hard to the feel. Not much laboratory investigation could be done, as the patient died the next day. A blood examination, however, was done and showed: Total leucocytes 6,100 per c.mm.; neutrophil polymorphs 76 per cent; lymphocytes 22 per cent; monocytes 1 per cent; eosinophils—1 per cent; a clinical diagnosis of hepatic cirrhosis (post-necrotic scarring) with splenomegaly was made.

Post-mortem Findings—*Macroscopic Appearances*: The peritoneal cavity contained two pints of clear, straw-coloured fluid. The liver was enormously enlarged (2720 g.) and stony hard. The surface was smooth; there was a domeshaped prominence in the upper surface of the right lobe. The anterior border had some notches which possibly were responsible for the impression of nodular feel when the patient was examined during life. Not much resistance was noted on cutting, and the cut surface presented a mottled appearance. The spleen also was greatly enlarged (1640 g.). The capsule was thickened. The cut surface was bright red with numerous prominent and thickened trabeculae. The pericardial cavity contained an ounce of straw-yellow, faintly turbid fluid and the visceral pericardium had lost its normal shine.

A thorough examination of the whole body (including brain and cord, muscular system and skeletal system) did not reveal any other gross abnormality.

Microscopic Appearances: Heart—The middle coat of the medium and small sized arteries showed deposit of amyloid material (Fig. 1, *vide* Plate). The amyloid stained violet-pink and other elements blue—with methyl violet. Apart from the amyloid deposit in the middle coats of the arteries the only other abnormality was some amount of cellular collection (mostly lymphocytes with small number of plasma cells) on the pericardial surface. At places, connective tissue septa from the pericardium dipped into the myocardium and these showed minimal amount of amyloid deposit.

Stomach—There was deposit of small amount of amyloid in the middle coat of arteries in the submucosa which stained violet-pink with methyl violet.

Spleen—Apart from the amyloid deposit which was present in the middle coats of the arteries and in diffusely invading masses in the splenic pulp (the amyloid reacting specifically to methyl violet)—the spleen showed histological features characteristic of the condition described as Bengal Splenomegaly by De (1932) *viz.*, loss of splenic pattern, atrophy of the malpighian corpuscles, intense dilatation and congestion of the sinuses which were packed with red cells(lymphocytes, phagocytic giant cells and leucocytes and were surrounded by a small amount of pulp tissue, very poor in vital cellular elements.

Liver—The deposit of amyloid was extensive. It was as it were an ocean of amyloid with small islets of liver cells (Fig. 2, *vide* Plate). The deposit had no predilection for any particular area of the lobule—the small number of the surviving liver cells were strangulated by the invading mass of amyloid. Presumably the deposit started beneath the endothelial lining of the sinusoids —the increasing amount of amyloid gradually encroaching upon the liver cells and destroying most of them. Stained with methyl violet, the amyloid material was violet-pink and parenchymatous cells, blue.

Kidneys—There was extensive involvement of the middle coats of the arteries by amyloid deposit. Involvement of the glomeruli was minimal. The amyloid reacted specifically to methyl violet.

Adrenals—The deposit here also was very extensive. Zona glomerulosa was a mass of amyloid in which few cells could be discerned. Only stray groups of cells were visible in zona fasciculata. There was deposit in the middle coats of arteries in the medulla as well. Reaction to methyl violet was specific.

Pancreas—The middle coats of the arteries were predominantly affected with only minimal amount in

the connective tissue separating the glandular elements. The amyloid reacted specifically to methyl violet.

Prostate—Here as well the middle coats of the arteries were greatly involved by amyloid deposit—there being a very small amount of amyloid in the stroma (Fig. 3, *vide* Plate). Reaction to methyl violet stain was specific.

Discussion

The exact pathogenesis of amyloidosis is little understood. Although the true chemical nature of amyloid is not known it has been shown (Hass, 1942 and others) to be composed of 2 protein fractions and 1 polysaccharide. It has been suggested that it is deposited as a combination product, the result of reaction between a fixed component of the vascular well and some component of serum globulin. The predilection of the amyloid deposit for the arterial walls seems to bear this out. Hyperylobulinaemia, abnormalities of serum globulin (Eisen, 1946), allergic state (Jaffe, 1926; Atkinson, 1937), all these have been advanced as causes, but none convincingly enough. Experimental production of amyloidosis by repeated injections of nutrose and the spontaneous retrogression of the lesions when the injections are stopped would tend to suggest that hyperproteinaemia or allergy may be responsible factors but then total serum proteins in cases of primary amyloidosis, where determined, have been found to be essentially normal and in the 71 cases of primary amyloidosis collected and analysed (Higgins and Higgins jr., 1950) an associated allergy was found only in two instances. Further work is essential for a clearer understanding of the pathogenesis.

Not all the criteria formulated by Lubarsch (1929) have stood the test of later observations by others. Organs like the liver, spleen and kidneys which are most severely affected in secondary amyloidosis, are not only not immune to primary amyloidosis but may be the seat of the most extensive involvement in that condition (Dahlin, 1949; Higgins and Higgins jr., 1950; Mangalik, 1950). It is wise to reserve our opinion on the staining reaction of amyloid in the two types, until such time that the true chemical nature of amyloid and whether there is any such thing as pre-amyloid stage (as has been suggested to explain the variable staining reactions of primary amyloid), are known. The only criterion that has proved to be rigid is the absence of any inflammatory or suppurative lesion.

Failure to find any causes whatsoever after a thorough examination at necropsy (including microscopical examination) in our case points it as belonging to the primary type. The dominant feature of the distribution of amyloid was the widespread involvement of the middle coats of the small and medium sized arteries in different organs (heart, kidney, pancreas, spleen, stomach, prostate). Along with this there were extensive deposit in the liver, spleen and adrenals. The widespread involvement of the adrenal cortex explains the extreme asthenia and the hypotension, though pigmentation was absent or possibly too inconspicuous to attract attention. The end may have been hastened by an adrenocortical crisis.

As regards staining reaction, the amyloid in different organs reacted specifically to methyl violet. It was unfortunate that staining with iodine in the gross was not tried until the specimens had been in formol for a few hours. When tried, the amyloid in liver, spleen and adrenals failed to show the characteristic staining reaction. What the reaction would have been if it had been tried before the specimens were put in formol, we are not in a position to say. Presumably, it would have been negative, as fixation in formalin should not interfere with the staining reaction of amyloid. We did not try the congo-red stain in the histological preparations as dense collagen may give a false positive stain. And, of course, congo-red test was not tried during life, as the condition was not suspected.

We are inclined to think that primary amyloidosis is much more common than is apparent from reports in literature. Cases are rarely diagnosed during life and for obvious reasons. Cases where the amount of deposit is minimal (though widespread) may not cause grave symptoms at all. It is surprising to learn that remarkable health is compatible even with extensive deposit of amyloid in liver and spleen. The case reported by Higgins and Higgins Jr. (1950) had a liver extending below the level of the umbilicus and had no symptoms at all, only a routine check-up in the Army shunted him from active service to a hospital. In these cases where the amount of deposit is extensive, causing grave clinical symptoms and signs,—primary amyloidosis as a cause is seldom suspected. The case reported by Hartney *et al* (1949) where the clinical diagnosis was Pick's disease, and the case reported here where the clinical diagnosis was hepatic cirrhosis (post-necrotic scarring), are pointers. From a perusal of the literature it appears that there have been only about 15 instances where an antemortem diagnosis have been made (Lubarsch, 1929; Eisen, 1946; Higgins and Higgins jr., 1950). Advent of routine liver biopsy should help to improve matters. Considering the accessibility of the lesions in such a predominant number of cases (tongue, skeletal muscles, lymph node, liver) we are justified in hoping that if the possibility of the condition is kept in mind in all cases where the symptoms and signs indicate widespread involvement of various organs by a pathological process not attributable to commoner aetiological factors, more and more cases will come to light.

Acknowledgments

Our most grateful thanks are due to Dr. D. C. Chakravorty, M.B., F.R.C.S., Principal, Medical College and Superintendent, Medical College Hospitals, for permission to use hospital records.

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JOURNAL OF THE

INDIAN MEDICAL ASSOCIATION

CALCUTTA, OCTOBER, 1953

EOSINOPHILS

Of the corpuscles that circulate in the blood, eosinophils are the ones of whose function we know the least. These are very sensitive cells which react by an increase in many diverse and apparently unrelated conditions, though the phenomenon is by no means constant. Mild to moderate increase of eosinophils occurs in allergic states, helminthic infections, some skin diseases, in tuberculosis and in the convalescent stage of most acute infections. Sustained high eosinophilia is much less common, being met with in trichiniasis, angioneurotic oedema and eosinophilic leukaemia. There are two pulmonary conditions, viz., Loeffler's syndrome and tropical eosinophilia, which are associated with cough, bronchial spasm and a very high eosinophilia; they are believed to be variants of the same disease. In recent years tropical eosinophilia has been recognised as quite common in India; indeed, experienced clinicians, in dealing with unexplained chronic cough, first think of examining the blood for eosinophilia. In most cases a cure can be obtained with organic arsenicals, but its aetiology is still obscure. The difficulty lies in the fact that we are still ignorant of the part eosinophils play in our normal life. It, therefore, seems that a brief resume on eosinophils will be of interest.

Eosinophils develop from myeloblasts in the bone-marrow. They are actively amoeboid, but less so than the neutrophils. Their duration of life is 8-12 days as compared with 2-4 days in the case of neutrophils, most of them being destroyed probably in the reticulo-endothelial system. Their normal limits vary from 100 to 400 per c.mm., possibly more in tropical countries, but there are considerable variations from day to day and even hour to hour. There is a definite diurnal trend as in case of other leucocytes, viz., neutrophils, the count in an average case rises in the morning with a mid-morning fall below 8 a.m. level, rises again in the afternoon, reaching a peak of about 30 per cent above at night and then falls again. In clinical practice, therefore, at least two or probably 3 or 4 blood counts should be done unless marked deviation from normal is apparent from the first determination. If only one count is possible, it should be done in the morning under basal condition. There is no significant difference in count between fasting and non-fasting individuals.

It was observed long ago that in animals the proportion of eosinophils in the lymph rose higher after a meal which was rich in protein than one rich in carbohydrate. This association of eosinophil and protein has since then been frequently stressed, especially with regard to anaphylactic and related responses.

Although eosinophils possess some phagocytic properties over bacteria *in vitro*, they are not usually found in areas of bacterial invasion. They play some part in dealing with toxic materials, especially those derived from protein. Eosinophil reaction occurs around a leaking hydatid cyst, when the cells neutralise small quantities of fluid; this is also confirmed by *in vitro* tests. But if the fluid becomes infected, neutrophils take the place of eosinophils. If the cyst dies, becomes calcified or walled off with dense fibrous tissue, the associated eosinophilia disappears.

Most of the conditions with prominent eosinophilia are considered to have an "allergic" basis. The commonest mechanism of eosinophil increase in blood and tissues is an antigen-antibody reaction, i.e., a response of sensitised tissue to contact with sensitising antigen, as for examples, in serum sickness, parasitic infections, etc. It should be noted that sensitisation itself does not evoke eosinophilia, unless the sensitive person has been re-exposed to the antigen. Moreover, antigen-antibody union may occur during re-exposure without any increase in circulating eosinophils; consequently eosinophilia is not an invariable finding in allergic cases.

The significance of blood or tissue eosinophilia is not clearly understood in relation to allergy, the essential cause of which is release of histamine or some similar toxic substance. Histamine which is commonly present in a bound form in many tissues, when released, has a pronounced cell-damaging effect and produces capillary dilatation leading to local oedema which is usually found in many forms of allergy. Large amounts of histamine are present in lung and skin and this may account for bronchospasm and flushing seen in allergy affecting these organs. A recent view is that the function of the eosinophil leucocyte is to carry histamine to the tissues for inactivation and eventual elimination through the bronchus or destruction in the endothelial system.

It has been suggested that eosinophilia is related to antibody production. This seems to be the case from the following examples. In many acute infections accompanied by neutrophils, the eosinophils are diminished or absent but they return to the blood during recovery and are definitely increased during convalescence, while the neutrophils return to normal or even below normal. Some observers correlate the eosinophilia with the rise of antibody titre that occurs during this period. Antibacterial immunisation is always followed by an eosinophilia. When an artificial pneumothorax is induced in pulmonary tuberculosis, it is followed by an eosinophil-rich pleural effusion and blood eosinophilia. If the eosinophilia does not develop, the outlook is said to be unfavourable, and the more intense the eosinophilia, the bettter the prog-

nosis. This clinical observation can be explained by equating eosinophilia with antibody production. It therefore seems that one of the functions of eosinophils is intimately associated with development of immunity.

It is said that eosinophils are more abundant in tissues than in the blood being found especially in the respiratory and gastro-intestinal tracts. It is therefore referred to as "tissue-fluid leucocyte". Eosinophilic invasion of tissues is found in many pathological conditions probably all allergic, with or without eosinophilia, as manifested in the sputum of asthmatics, in intestinal blood and mucus of bacillary dysentery, in nasal secretions of vasomotor rhinitis, pleural fluid associated with tuberculosis or tropical eosinophilia. Eosinophils have remarkable power of infiltration in tissues. A case has been recorded in which the stomach was thus affected following Loeffler's syndrome. Pyloric hypertrophy due to massive eosinophilic infiltration between the muscle fibre has been observed in a patient with persistent eosinophil leucocytosis. Eosinophils in cerebrospinal fluid have been reported in cysticercosis of the central nervous system. Widespread infiltration of voluntary muscle, myocardium, pulmonary alveolar walls, splenic pulp, lymph glands, liver and kidney by mature eosinophils has been found in eosinophilic leukaemia. In Hodgkin's disease there is more constant tissue eosinophilia than blood eosinophilia; the same is probably true of asthma.

Since bone marrow is the source of all eosinophils and as there may be tissue eosinophilia without blood eosinophilia, the bone marrow picture should indicate the degree of body eosinophilia as a whole more reliably than does the blood picture.

Very little is known of the mechanism that regulates eosinophil production. There is increase after splenectomy and as a result of giving liver. A recent important discovery is the influence of suprarenal cortex. When it is healthy and stimulated by A.C.T.H. or cortisone, there is a drop in circulating eosinophils, by 50 per cent or more with some increase of neutrophils, said to be affected by an increase of 17-hydroxycorticosteroids in the blood. This test known as Thorn test is used as a criterion of adrenocortical function. Eosinophaenia (conventionally applied to 70 cells or less per c.mm.) also occurs from stress due to trauma, operation and sudden exposure to cold in which adrenal is believed to play a part. On the other hand there is a well-established link between allergic processes and eosinophilia, and cortisone and A.C.T.H. have been shown to combat many allergic manifestations and appear to have an effect in immune mechanism. Therefore, there seems to be some relationship between these four factors, eosinophilia and allergy, on the one hand, and eosinopenia and adrenocortical hormones on the other which further studies may clarify.

From the above it appears that eosinophils contribute to the defence of the organism against intoxication and by the development of immunity.

OUR NEW YEAR

Another year has rolled by in the life of this journal. With this issue we are commencing our twenty-third year's journey. During the past twenty-two years it had to weather many a storm to get a foothold in the profession as well as in the field of medical journalism and we are grateful to the merciful Providence for piloting us through these years.

The year that is just over was marked in its early stages by difficulty in obtaining supply of super-calendered paper on which we were printing the journal of late and had perforce to have recourse to imported mechanical paper which was of inferior quality. We had to face the rapid onset of economic depression all round us. But we must mention that we are now out of the woods so far as the supply position of paper is concerned but our finances not having reached a stable footing we regret we could not succeed in fulfilling our pledge of converting our journal into a fortnightly one from this month. We are awaiting a more propitious time for undertaking this venture.

The Editor was privileged in the year under review to attend the Third World Medical Editors' Conference as a delegate at Athens. He thereafter visited the offices of the national medical journals of Greece, Italy, West Germany, Austria, Sweden, Norway, United Kingdom, France and Switzerland. We immensely profited by this visit as we could compare notes with our counterparts in these countries. We must acknowledge with gratitude the ungrudging assistance we received and the many valuable suggestions we had for the common benefit of the profession and the people.

We are gratful to our learned contributors from different parts of the world for sending us valuable scientific materials which have helped largely for the sustenance of the journal and continuance of the hold it has acquired during these years. We are sorry that due to the limited space at our disposal we could not do timely justice to those contributors by publishing many of the articles. We regret this very much and let us hope conditions will improve in the near future and we shall continue to receive the invaluable co-operation from the scientific world as in the past.

The members of the all-India and local advisory committees have placed us under a deep debt of gratitude for the excellent advice we received from them from time to time on every detail.

The ungrudging assistance of our referees who took great pains in scrutinising and suggesting improvements in the articles received by us were noteworthy.

Let us hope with the sincere co-operation and good will of our numerous well-wishers in the profession and in the manufacturing trade and industry, we shall be able to give a better account of ourselves next year.

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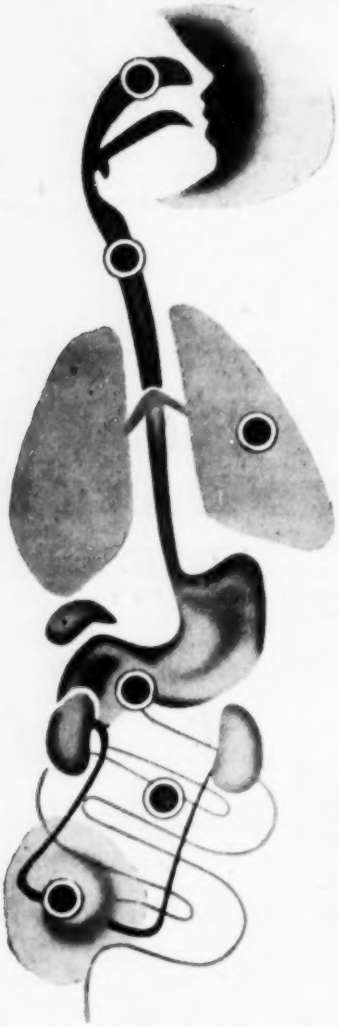

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DR. T. S. TIRUMURTI

We mourn to-day the loss of Dr. T. S. Tirumurti who adorned the exalted office of the President of our Association only last year. Although he retired from Government service as Principal of the Stanley Medical College, Madras, he took a great deal of interest in civic and public health measures, as evident by the fact that he took upon himself the responsibility of organising the medical services in Travancore State after his retirement. He was not keeping well of late but in spite of this and because he had buoyancy of heart and mind, he did not spare himself. He travelled about from place to place to organise the medical profession under the banner of the Indian Medical Association throughout the length and breadth of this vast sub-continent. It may truly be said that he died full of years and honours which very few members of the medical profession are fortunate to receive. We miss him to-day very badly because his association with us was of such an intimate nature that at his passing away we have the feeling that we have lost the oldest member of the family and our grief knows no bounds. The tragedy of his passing away was that while he was travelling on duty, entirely self-imposed, he had a cardiac seizure and he left this mortal world practically unattended by his near and dear ones. This has added further gloom to the unfortunate incident. We vividly recollect that whenever he had occasion to come to this part of the country, he would come to this office and discuss various matters connected with medical journalism. Particularly he gave us unsolicited advice regarding our new venture, the publication of "Your Health" and contributed a good number of articles for its growth and stability. We can only add our humble share to the numerous messages received by his widow and children with the hope that their sorrow and grief will be lessened to a certain extent in the thought that so many of us are sharing the same.

RAO BAHADUR DR. T. S. TIRUMURTI
Born 28-11-1885 Died 26-8-1953

LIFE SKETCH OF LATE DR. T. S. TIRUMURTI

Dr. Tirumurti belonged to a distinguished family of Coimbatore. His father late Sri T. N. Subba Ayyar in his days was a great educationist. After passing the I.A. examination in the first division, he joined the Madras Medical College and took the M.B.C.M. Degree in the year 1909. He entered the Madras Medical Service as a Civil Assistant Surgeon and soon became the Professor of Pathology in that College. In the year 1930 he acted as the Principal of the Medical College at Visakhapatnam and the following year acted as Vice-Chancellor of the Andhra University. When the Royapuram Medical School was raised to the status of a college to cope with the increasing demand of medical education the then Public Health Minister Dr. T. S. S. Rajan appointed him as the first Principal of the Stanley Medical College. In that capacity he amply justified the confidence reposed in him and made that College one of the premier institutions in the State.

As one who was keenly interested in the study of higher branches of medicine his services were utilised in many capacities. He was President of the Madras Branch, the South Indian Provincial Branch and lastly the President of the Indian Medical Association for the year 1951-52.

After retirement he settled down in Madras and interested himself in the cause of education and other public activities. He was, up to the time of his death, President of the National Education Society under whose auspices the National High School for boys and girls are run at Triplicane.

He was a man of sturdy independence and never lost the opportunity to assert himself. His resignation of the seat in the Indian Medical Council on the scope of the non-recognition of quallfications of the Andhra Medical College by that Council produced a great stir and resulted in the ultimate realisation of the cherished ideals of the profession.

Of late he undertook strenuous tours on behalf of the Indian Medical Association on the WHO programme visiting many places in northern India and subsequently in the Andhra area when the summer was at its highest pitch. He had programmed to tour the Mysore State on similar propaganda when he was snatched away from our midst on the railway journey between Bangalore and Mysore. He died a glorious death doing his duty to the last breath of his life.

As a mark of respect to the memory of the deceased the office of the Journal of the Indian Medical Association was closed on August 29, 1953.

CURRENT MEDICAL LITERATURE

Treatment of Hyperthyroidism

Bartels (*Ann. Int. Med.*, **37**: 1338, 1952 writes that in the past eight and one-half years 2,400 patients with hyperthyroidism have been given one of the antithyroid drugs until a euthyroid state was established and then treated by radical subtotal thyroidectomy. Of these 2,400 patients, 1,500 received propylthiouracil in doses of 200 to 400 mgm. daily, and 214 were given methimazole (tapazole) in doses of 20 to 40 mgm. daily. Both propylthiouracil and methimazole were found to be effective antithyroid agents, with a low incidence of side-reactions. Antithyroid drugs must be administered under careful observation, since serious blood changes (agranulocytosis and granulocytopenia) are a real danger. When these drugs are used preoperatively, dosage must be determined for each patient individually and thyroidectomy should not be done until a euthyroid state is reached and all evidences of hyperthyroidism and resulting physical depletion are overcome. If this is accomplished, a low operative mortality is possible, as shown in the author's series in which there were only five postoperative deaths (0·2 per cent), all occurring in patients with associated cardiac disease. Of the 2,400 patients, 27 were pregnant; 21 of them had normal deliveries at term yielding 23 healthy infants. Antithyroid drugs can safely be given to pregnant patients with hyperthyroidism if myxœdema is avoided preoperatively and postoperatively until the time of delivery. Postoperative tetany occurred in 70 (3 per cent) of the first 2,300 patients, and was permanent in 42 (1·8 per cent). In all of these patients the tetany was controlled with powdered calcium lactate alone or in combination with vitamin D. Hyperthyroidism recurred, even after radical thyroidectomy, in 33 (1·9 per cent) of the 1,670 patients who had had periodic metabolic studies for three to eight years. These patients were treated selectively; in most patients the disease was controlled either by the daily administration of iodine or by a second surgical intervention removing the recurring thyroid remnants. Postoperative myxœdema occurred in 69 (7·3 per cent) of the 942 patients who could be followed; it was transient in 13 (1·3 per cent) and permanent in 49 (5·2 per cent), while 7 could not be followed adequately. Myxœdema occurred any time within five years after the thyroidectomy, and it was transient up to the third year. In most patients, however, postoperative myxœdema developed within the first year and remained permanent if thyroid administration was required after the first year. Desiccated thyroid controlled all cases of postoperative myxœdema; the usual daily dose was 0·1 gm. (1·5 grains) or less.

Thiouracil in Chronic Ulcerative Colitis

Herfort and Livingstone (*N. Y. State J. Med.*, **52**: 431, 1952) report 15 cases of chronic ulcerative colitis treated with thiouracil and propylthiouracil, thiouracil being used in 8 cases and propylthiouracil in 7 cases. Thiouracil was given in a dosage of 200 mgm. three times daily and propylthiouracil in a dosage of 100 mgm. three times daily. In each case, the drug was employed for at least three months and was continued until there was significant improvement in symptoms. Of the 15 patients 8 were females and 7 were males; the ages ranged from eleven to fifty-two years and the duration of the disease from six months to fifteen years; in all but 2 patients the onset of symptoms occurred before the age of forty. All patients showed some degree of improvement, especially a decrease in the frequency of bowel movements and relief of abdominal cramps; gross blood in the stools was either much diminished or completely disappeared. There was a gain in weight in 14 patients which was most marked in adolescent and young adult patients. Basal metabolic rates were determined in 7 patients before and after the administration of the thiouracil drugs; only one of these patients showed a "gross" decrease in the metabolic rate; this patient also developeed enlargement of the thyroid while taking thiouracil; another patient who showed diffuse swelling of the thyroid showed no significant change in the basal metabolic rate. Only one patient showed signs of toxicity—arthralgia and periarticular swelling which disappeared when the drug was discontinued. An increase in hæmoglobin levels up to 6·5 gm. per cent was noted; as the hydration of these patients improved as the diarrhœa diminished, this indicates a definite improvement in the blood picture. As these patients were all ambulatory, other blood studies were not made. Proctosigmoidoscopic examination in 7 patients with active ulcerative colitis showed the rectal mucosa to be grossly normal following treatment; in 2 other patients, signs of active inflammation had disappeared, although a residual polypoid change persisted. In 5 patients x-ray studies were made during drug therapy; only one of these patients showed significant improvement; this patient had an ileostomy and an ileosigmoidostomy was done after improvement under thiouracil therapy; he is now free from symptoms fourteen months after intestinal continuity was restored and fifteen months after thiouracil was discontinued. These results indicate that the thiouracil drugs have a definitely beneficial effect on chronic ulcerative colitis; it is suggested on theoretical grounds, that this may be due to the effect of these drugs on the parasympathetic nervous system.

Management of Late and Latent Syphilis

McElligott (*Brit. M. J.*, **1**: 829, 1959) in dealing with the treatment writes that few will deny that the treatment of late syphilis has been, and perhaps sometimes still is, notoriously unsatisfactory. Many physicians, often obsessed by the bogey of persistently positive blood reactions, have traditionally insisted on years of treatment with arsenicals and bismuth, which was only terminated by the collapse of the patient's health from the toxic effects of the treatment, of his morale from anxiety, and not infrequently of his bank balance. Though at least another decade must pass before the results of penicillin in late syphilis begin to be known with certainty, an encouraging indication of its probable effect is already provided by the results in neurosyphilis. In the great majority of patients treated, sustained improvement in the spinal fluid occurs, and provided that irreversible structural damage to brain or spinal cord has not yet taken place, clinical results are much more impressive than after malaria and arseno-bismuth treatment and are, moreover, more rapidly attained.

Penicillin and Cardiovascular Syphilis: Cardiovascular syphilis is often not diagnosed until irreparable harm has been done, and though even then quite a modest amount of treatment will probably heal the chronic inflammatory process, the resulting structural damage to the aortic wall or valves may inevitably shorten life. The author, however, is becoming increasingly convinced that prompt intensive treatment with penicillin will in most cases, by halting the inflammatory process, improve the prognosis and help to prolong life. Earlier diagnosis, rather than better treat-

ment, would seem to be what is wanted for the successful management of this condition. Dr. J. H. Stokes and his colleagues in Philadelphia reported the results of treating over 100 cases of various types of cardiovascular syphilis with penicillin alone during the last five years, and it is interesting to note that in this series no evidence of significant therapeutic shock or vasculo-toxic effect was forthcoming, neither were any certain cases of therapeutic paradox encountered. The penicillin was well tolerated even by the decompensated heart, and clinical improvement, particularly of anginal pain, was noted in a high proportion of cases.

Dosage of Penicillin: The author would commend without prejudice the idea of following an initial intensive course of six to twelve million units of penicillin, lasting from ten to fourteen days, with not more than two courses each of ten twice-weekly injections of 9000,000 units of procaine penicillin in oil with aluminium monostearate (P.A.M.). He maintains that each one of these injections will be far more therapeutically active than the fullest dose of any arsenical or bismuth preparation, and, which is perhaps more important, that it can do no harm.

It is perhaps as a preventive of congenital syphilis that penicillin has had its greatest success, and it is now established that as little as eight to ten days' intensive treatment of a syphilitic pregnant woman will almost always ensure that her infant is born free from disease. The expectant mother whose blood tests have proved positive on routine examination can thus be assured of her baby's safety, and every effort should be made to allay her anxiety.

In conclusion, the author would restate his belief that in penicillin we have the most powerful, as well as the safest, treponemacidal agent yet known; that the progress of the disease can in most cases be rapidly and effectively halted by its intelligent use; and that its true value in late and latent syphilis will be certainly known only when careful clinical, cardiographic, and pathological observations (to include always examination of the cerebrospinal fluid) become general practice and when post-mortem study of treated cases becomes the rule rather than, as at present, the comparatively rare exception.

Aureomycin in Mumps

Homer and Donovan (*J.A.M.A.*, **150**: 465, 1952, Ref. *Practitioner*, **169**: 684, 1952) treating alternate cases with aureomycin were 'unable to demonstrate that aureomycin had any beneficial effect in epidemic parotitis (mumps) or its complications'. There were 24 men, aged seventeen to twenty-five years, in each group, and the dosage schedule of aureomycin was 500 mgm. four times a day for twelve doses if the patient was afebrile. In patients who continued to be febrile, or later developed febrile complications, aureomycin was continued, or begun again, in the same dosage until the temperature remained normal for twenty-four hours. The duration of glandular swelling averaged 8·1 days in the aureomycin group, and 9·3 days in the control group. The duration of pyrexia in the aureomycin group was 4·4 days, and 3·4 days in the control group. The duration of the illness and of the stay in hospital was similar in the two groups. Orchitis developed within twenty-four hours of admission to hospital in three of the aureomycin group and two of the control group, whilst it developed subsequent to the first day in hospital in six of the aureomycin group and three of the control group.

CURRENT TOPIC

MEDICINE AND PUBLIC HEALTH IN U.S.S.R.*

A. C. UKIL,
Calcutta

General Background of Social and Economic Progress, Influencing the Status of Public Health

In understanding the progress in Russia, one has to remember Russia's technological backwardness at the time of the Revolution (1917). Knowing that science has developed more rapidly than society's adjustment to the new conditions created by it, the authors of the Marxist Revolution wanted to make a gigantic effort, by forced marches through successive 5-year plans since 1928, to apply the principles of science to the basic processes of life, to production, distribution and consumption in the whole of the Soviet Union. They wanted to banish these by the creation of a Socialist State.

The Soviet Union is one of the largest countries in the world. Its population in 1951 was 200 million. The natural population increase is 3 million per year. According to the 1939 census, 94·3 per cent of the able-bodied population consisted of wage-earners and collective farmers. 10 per cent of the population were engaged in Sovkhozes (State collective farms) and Kolkhozes (co-operative farms) and 15 per cent were employed in industry. 30 million pupils (=15 per cent of the population) were under free and compulsory secondary education. 90 per cent of the students under higher education received merit stipends. There were equal opportunities for men and women. In fact, in almost every educational institution, half the students were girls. Over a million and a quarter students read in 33 universities.

The minimum requirements for organised social life have got to be judged in terms fo food, housing, clothing, education, health, social security, cultural recreation and integration of the individual (citizenship).

Since correct nutrition is an essential factor in health, the health authorities have an important part to play there in the solution of the food problem. Collective and mechanised farming has ensured enough food to consume and to spare. The State feels responsible for producing and distributing food to individuals according to their physiological needs. The supply of food has become a public service. Collective feeding operates under strict medical supervision. Each factory kitchen has its bacteriological and chemical laboratory. The food that comes in and goes out is always tested for purity and nutritional value. All food handlers are required to wear sterilised coats and caps and to have shower baths before and after work. The people seemed to be well fed and adequately clothed.

Improvements in housing are being rapidly effected, both in urban and rural areas. The trend is to change the standard of housing from Asiatic conditions to that of the best western types. Extensive educational facilities and progress aid in health education and promotion of health.

Improvement of cities and villages, sanitary inspection of homes and sources of water supply as well as of establishments engaged in the production and sale of food products, quarantine of cases of infectious diseases, disinfection, vaccination and a study of epidemicity—these were the tasks the health bodies were occupied with from the beginning. With

*Based on a visit to U.S.S.R. as a member of a Scientific Delegation from India in 1951.

the development of industry, it became necessary to institute special sanitary inspection in industry (1933). Comprehensive legislation on labour protection, improvement of towns and rural localities, organisation of catering and of the food industry, and provision of wide opportunities for rest and recreation for the working people were measures to check the spread of infection and prevent its development. The system was gradually extended to the transport system, Kolkhozes and Sovkhozes. Huge funds were set apart for research into the causation, diagnosis and treatment of disease. The initiative of the masses was greatly stimulated by the health education conducted by medical workers in medical institutions, schools, rural reading rooms and workers' club, as well as over radio and through the press.

In U.S.S.R., the protection of the health of the population is a duty of the State. According to Article 120 of the constitution, citizens of the U.S.S.R. have the right to maintenance in old age and also in case of sickness or disability. This right is ensured by the extensive development of social insurance of factory and office workers at State expense, free medical service for the working people and the provision of a wide network of health resorts for the use of the working people (accommodating 500,000 workers at a time during vacations, with full pay). The State has also taken over the production of medicaments and their supply to the population. All medical care is free and available to all, regardless of the patient's resources. The State's aim is not merely to cure disease but to prevent it, by creating such living and working conditions as would make the occurrence of disease rare.

The general practitioner has become the link between the medical and health centres and the home. He does medical-prophylactic work, sanitary-prophylactic work, and is, at the same time, the social worker and educator of the people.

Medical Education

The general educational pattern has been described by me in an article.* I shall, therefore, give here a short account of medical education in U.S.S.R.

In the initial stages, they opened medical schools for a short course or "feldscher" type of training, in order to man the medical service of the country with qualified personnel, but these have nearly been gradually abolished. During the first 5-year Plan (1928-32), only 14 medical colleges were opened. Now, there are 73 medical colleges turning out 18,000 medical graduates every year. There is no unemployment. As soon as they pass out, they are immediately offered posts, according to the requirements of the Master-Plan of the country. Stipend-holding medical students, when they pass out, are required to work in rural areas for 3 years. After receiving a broad-based experience there, they are transferred to urban areas or to research institutes as desired by them. The vistas of progress are open to everybody and the social conditions created encourage it.

Students who pass out the Higher Secondary or 10-Year School are eligible to join the university medical and other courses. For a medical course, the students have to supply a short life sketch and 3 photos. Thereafter they have to appear at an examination, thoretical and oral, in physics, chemistry, biology, literature and political economy. The best among them are admitted according to vacancies available. 50 per cent of the vacancies are usually filled up by girls. Some of the medical colleges have more than one Faculty, besides that of General Medicine and Prophylaxis, viz., Faculty of Hygiene or Faculty of Maternity and Child Welfare or of Pediatrics.

I must mention here an excellent system which enables a poor man who passes out of a Junior School and then joins a lower technical job but by joining evening classes for 3 or 4 years in language, literature, mathematics, physics, chemistry and political science he passes the Senior School examination and thus becomes eligible for joining degree courses at the University. The Workers' Faculties are designed to prepare adult workers for the higher educational institutions. We saw several instances of Professor or Director of research institutes who had come up in this manner.

We visited two Medical Colleges—(1) the Second Medical Institute (Estd. 1906), one of the best in the country, at Moscow and (2) the Medical Institute at Alma Ata, capital of Kazakstan.

The Second Medical Institute at Moscow admits 600 students every year and the total number of students is 4,000. The institution has, attached to it, 12 hospitals with 5,000 beds. 5-7 beds are allocated to each student during interim training.

In the Soviet Union, as in continental Europe, the general science courses with medical bias (physics, chemistry and biology) are taken in the medical college.

The seminar method of teaching, which prevails in Germany and U.S.A., also prevails in U.S.S.R. In addition to seminar ending examinations, yearly tests are carried out. An effort is made to establish the right balance between lecture courses, and practical, laboratory and clinical work. In good medical colleges, there is often more than one Faculty (Pediatrics or Hygiene). During the first five semesters, the students of all faculties study together. For the second five semesters, the faculties have separate curricula, the first three of them being practically identical. Students of pediatrics receive specialised instruction only in the last year. The sixth year of instruction is utilised in practical work in hospitals, polyclinics and other medical centres. The ratio of students to each faculty is regulated according to the needs of the country. Of every 100 students, approximately 75 graduate from general medicine, 15 from pediatric and 10 from hygiene faculties.

More than 90 per cent of the students receive stipends from 250-300 rubles per month. Merit scholarships (22 at the time we visited the institution) vary from 450-600 rubles per month. All out-of-town students, about 60 per cent of the total enrolment, live in dormitories. There are arrangements for the supply of meals at small cost. 1,500 students of this institute belong to the Science Study Club, which has over 25 sections devoted to the study of the various specialities.

There is a Dean for each Faculty. The whole Institute is headed by a Director, assisted by two Deputy Directors. There are 400 teachers on the staff, so that there is one teacher for ten students. The word "teacher" or "professor" is very loosely applied in our country. To attain the status of an Assistant Professor or Professor, the following steps are necessary:—After graduating, good students who aspire for a rsearch career apply for a research fellowship for the position af an "Aspirant" for 3 years. At the end of this period, he has to prepare a dissertation on his work and is examined. If he gets through and wishes to continue his research career he has to work on a line of research for 7-8 years when he is called a "Candidate for Doctorate" (M.D. or D.Sc.). At the end of his training, he has to

*Lecture delivered at the Asiatic Society on 19-9-51 and published in *Science and Culture*, February, 1952.

Left—A Creche Baby having a Sun Bath. *Centre*—A Sick Child in a Pediatric Hospital at Moscow. *Right*—Convalescing Baby Receiving Gymnastic Movements at theFirst Moscow Pediatric Hospital.

Left—The Famous Experiment for Extracting Gastric Juice in Dogs, Pavlov Institute of Experimental Medicine, Leningrad. *Centre*—Babies Fed at a Creche near Moscow. *Right*—The Author and Prof. Engelhardt, Director, Central Institute of Experimental Medicine Standing beside the Personal Desk of the late Prof. Pavlov at the Institute at Leningrad.

prepare a thesis and to appear at an examination. When he obtains a Doctorate he is eligible to be appointed either as an Assistant Professor or Professor in a Medical Institute. Each member of the staff works on one or two research problems in the year. In 1950, the workers of this Institute published 500 papers in Journals, besides 30 monographs and were training 70 Aspirants, 20 of whom got the Doctor's degree. These research workers obtain handsome scholarships for appreciation and encouragement. In 1951, 7 Professors of this Institute obtained Stalin Prizes, the highest award in the State. The Institute has a large functioning library.

In 1950, out of a total budget of 36 million rubles, it spent R 1,200,000 for equipment and R 900,000 for research. A ruble=one rupee and two annas. The Director of the College got a monthly salary of R 8000, each Deputy Director —R 7000-8000, Professors at R 7000 and Assistant Professors at 6000. The equipment of the various departments was lavish and almost all the equipment were of Russian manufacture. As has already been mentioned, every graduate, who has been the recipient of a stipend, has to go to a rural centre to work under experienced physicians for three years. This system gives them an opportunity to know the rural people and about their health requirements. These doctors receive 20-25 per cent higher salaries according to the remoteness of the regions and are also entitled to a longer vacation.

Subjects Taught at the 2nd Medical Institute at Moscow

First Year—Physics, chemistry—inorganic and analytical, Biology and Parasitology, Anatomy, Histology and Embryology, Foreign language (190 hours in 2 years), (Latin (108 hours), Principles of Marxism-Leninism (125 hours).

There is compulsory Physical Culture in all the years.

Second Year—Anatomy, Histology, Physiology, Biophysics, Biochemistry (including organic and colloidal), Microbiology, Foreign Language, Marxism-Leninism (125 hours).

Third Year—Pharmacology, Microbiology, Pathological Physiology, Pathological Anatomy (including autopsy), Internal Medicine (including diagnostics, special pathology and therapy), General Surgery, Operative Surgery (including topographical anatomy), Roentgenology.

Fourth Year—Internal Medicine (including clinical therapy and course on tuberculosis), Neurology, Dermato-venereology, Hygiene (including organisation of health services), Clinical Surgery (including special surgery), Urology, Obstetrics and Gynæcology, Infectious Diseases and Epidemiology, Physiotherapy, History of Medicine, Pediatrics (212 hours in 2 years).

Fifth Year—Hospital therapy, Obstetrics and Gynæcology (including Labour Ward duty), Hospital Surgery (including traumatology), Orthopædics, Ophthalmology, Oto-rhino-

laryngology, Infectious diseases and Epidemiology, Pediatrics, Psychiatry (100 hours), Forensic Medicine (100 hours), Military Medicine (including chemical defence and sanitation), Balneology, Medical applications of physical culture (gymnastics).

Sixth Year—Practical work in hospitals and medical centres.

Although students are admitted into medical colleges after an entrance examination, those who fail at the end of the second year of studies are not allowed to continue them but are guided to enter other lines of study for which they are fitted. Later on, at each annual examination if a student fails, the Board of Examiners consider each case of failure separately and if there is no explicable cause, the failed students are asked to discontinue their studies. The Council of Examiners is constituted by the Professors of the college. With this method of careful sieving, we were told that all the examinees passed out at the final examination. On the 5th July, 1951, we attended a Convocation of the Second Moscow Medical Institute, where 720 students received their degrees, 90 per cent of whom obtained high class marks. At this convocation, the President of the Council of Examiners, Deans of Faculties and a girl student spoke.

Our visit to a Medical College at Alma-Ata, capital of one of the once-backward Republics (Kazakstan) was also fruitful. The college and the hospitals were well installed and the ratio of teacher to student was 1 : 10. Every department is well equipped for research work and a large volume of work is turned out. The accepted slogan at every Institute is "Every scientist must be a teacher and every teacher a scientist." The late Prof. Pirogov laid down that "Instruction without scientific activity is nothing but glitter, no matter how alluring the exterior." There is also a Medical School in Kazakstan, with course of studies for 4 years. These lower-grade schools (for feldscher training) are being gradually abolished.

Training of Middle Medical Workers

Middle medical workers consist of the following categories—feldsher, midwife, medical nurse, laboratory technician, dentist and pharmacist. Their entrance qualification is passing out of a Junior School Course and the course of training occupies 2-4 years. The higher courses are for 5-6 years, following the Senior School Course. Dentistry plays an important part in Soviet medicine; there is no medical centre or health resort which does not have its dental department. They are trained in four or five year course in dental schools or stomatological institutes.

Pharmaceutic institutes arrange for the training of pharmacists, forensic chemists, administrators for the pharmaceutic industry, research workers and teachers in pharmacy.

The Institute for the Protection of Motherhood and Infancy at Moscow and other schools of midwifery (over twenty at present) arrange for a three-year course of theoretical and practical training for midwives, whose main field of activity is in rural areas. Two types of nurses are trained in 2-year courses: medical nurses and nursery nurses. The senior nursing education is for 4 years. The Red Cross arranges for an eighteen-months training for health instructors.

Post-graduate Medical Education

Once in 3 years, all doctors are required to attend a course of 3-4 months Refresher training, when they receive full pay, besides free board, lodging, transportation and cost of new text-books. Specialist's training of longer duration is provided for in 11 Institutes for specialisation. Short ten-day courses for physicians are available at various medical institutes for informing them of new developments in tuberculosis, malaria, syphilis, occupational diseases, etc.

Each of the constituent Republics has its own training and research institutes. The workers of these institutes are trained in Central Institutes for the relevant subjects located in various parts of the Union. We visited several of them. They are elaborately organised, lavishly equipped and adequately staffed. These central institutes direct the work of other institutes in the Union. For example, the Central Tuberculosis Institute near Moscow, which has 16 departments, one of which deals with organisational and methodological research associated with field activities, is run by Madam Zeneida Lebedeva, who was originally a nurse, then finished her medical course and joined the research department. The State Pediatric Medicine Institute at Leningrad acts as the spearhead for the operation of the wide network of mother and child-craft institutions all over the Union, and is the higher training centre for pediatrics. A majority of the graduates of this institute work as Pediatricians all over the country. The function of the Institute is the study of the development of children and of the anatomy, physiology, pathology and treatment of morbid conditions, including their prevention. There are 1000 beds for normal children (from premature babies onwards) and 100 beds for sick children (0-18 yrs.) attached to the Institute. It has forty departments, each under the charge of a Professor, elaborately equipped with apparatus for autopsy (which is obligatory in U.S.S.R. by State law), histopathology, microbiology(biochemistry and other investigational facilities, including library

Left—Institute of Experimental Medicine. *Centre*—The Pavlov Institute of Physiology, USSR Academy of Science, Leningrad. Right—Biological Station in Koltushy, now Renamed Pavlovo

facilities. This Institute publishes 2 journals (1) Journal of Pediatrics, and (2) Problems of Pediatrics.

The Pavlov Institute for Experimental Medicine at Leningrad, which we also visited, is devoted to the elaboration of ideas propounded by the late Prof. Pavlov, whom the author of this article, had the pleasure of knowing. Prof. Kupalov, who is one of the oldest pupils of Pavlov, is now in charge of this Institute. Prof. Engelhardt, Director of the Central Institute for Experimental Medicine, showed us round. The main activities of this Institute are at present: (1) materialistic foundations of normal and sick physiology in terms of Pavlov's concepts, (2) metabolism of tissues and organs (A Calcutta Biochemist's researches have stimulated certain lines of research in this section), (3) functional biochemistry of heart, muscle, digestive glands, cellular structure, etc., (4) higher nervous activity, including hypnosis and sleep, and neurosis. The 'tower of silence', as the soundproof laboratory for experiments on dogs is called, is remarkably ingenious. Every Institute is, of course, equipped with the histopathology and microbiology department. The research institutes visited in Kazakstan were also found to be elaborately equipped and well-staffed. All the Institutes under the Academy of Medical Sciences are all-Union or Central Institutes for research and post-graduate training, closely related to unsolved problems in the domain of clinical research in hospitals and epidemiological research in the field.

Medical Research in U.S.S.R.

Scientific research, both theoretical and applied, is given a high premium. The most important Government department in the Soviet Union is the State Planning Commission (Gosplan). The Academy of Sciences had in 1950, 880 research institutes under it. Besides, every constituent State has its own Academy of Sciences closely connected with the all-Union Academy. The members of the Academy receive high salaries and a number of privileges, such as good living quarters, automobiles, chauffeurs, elaborately equipped rest homes, etc.

What the Academy is to science in general, the *Academy of Medical Sciences*, founded in 1944, is to Medicine. There are three main Divisions of the Academy each having ten or more Institutes under it: (1) Division of Medico-biological sciences, (2) Division of Hygiene, Microbiology and Epidemiology, and (3) Division of Clinical Medicine. There are about 100 central medical research institutes and 210 other research institutes staffed by over 40,000 research workers, 40 per cent of whom are women.

The Scientific Medical Council is the highest consultative body of the Soviet Ministry of Health. It consists of 120 representatives of the various medical and scientific sections. It has over 30 Standing Committees covering various medical specialities. The one on Hygiene consists of three Commissions: (1) on occupational diseases, (2) on school hygiene, and (3) on municipal sanitation. The Council investigates in detail the research plans of the various institutes and departments. There are no non-scientists on these commission or committees, unlike in India.

The State Medical library keeps several millions of books and contemporary foreign literature and supplies spare sets to institutions in the other Republics. The State Publishing House of Medical Literature (called Mdgiz), established in 1937, publishes most of the medical literature. There are over 50 medical periodicals, with a circulation of nearly 15 million copies. Only one Journal (Bulletin de Biologie et de Medicine Experimentelle de U.S.S.R.) contains summaries in English, French or German. The others are in the Russian language.

The Organization of Medical and Health Services

Lenin laid down the following instructions in a decree in July 1918: ("(1) To carry through resolutely extensive sanitary measures in the interests of the working people, such as (a) improvement of health conditions in populated places (protection of soil, water and air from pollution), (b) organisation of public catering on a scientific and hygienic basis, (c) launching of measures to prevent the outbreak and spread of infectious diseases, and (d) creating a code of health legislation; (2) To combat social diseases, such as tuberculosis, venereal diseases, alcoholism etc.; (3) To make competent medical and pharmaceutical services available to all free of charge."

In 1913, there were only 20,000 qualified doctors in Russia. To-day, there are 220,000 doctors only under the Ministry of Health, excluding a large number in Railways, industry, etc. Of 1,000,000 women engaged in public health service, 100,000 are doctors. The rapid industrialisation of the country and collectivization of agriculture needed a variety of services to suit their special requirements.

The direction of health protection work *in towns* is concentrated in the public health departments of the Executive Committees of the City Soviets of Working People's Deputies. Large cities are usually divided into districts, and each of these has its own public health department, which is subordinate to the city public health department. Each city district has its own dispensaries, clinics, polyclinics, hospitals, and so on. *In rural areas*, the direction of the health services is concentrated in the departments of public health of the respective districts.

There is, at present, one doctor for 800 people in urban industrial areas and one doctor for 1,000 people in rural areas. There are 10·5 beds per 1,000 people. This ratio prevails all over the union. With the larger output of doctors as time passes on, this ratio will be further reduced. No doctor, when he passes out, is unemployed. Private practice being practically *nil*, doctors devote their whole attention to the curative, preventive and educative work of raising the health status of the people. Younger staff at the Polyclinics and Dispensaries in cities are required to devote half time at the clinic and half for domiciliary visits. In this way, a liaison is maintained between the medical centre and the home. A doctor thus not only attends to the early detection of diseases and early cure but also to medical and sanitary prophylactic work, while he becomes at the same time a social worker and educator of the people.

Beginning from antenatal and postnatal work, doctors, nurses and dieticians take charge of the *nursery or crêche*, where infants of 2 months to 3½ years are taken care of. This section is under the Health Ministry, while from the Kindergarten to the end of the school system the Education Department takes charge of their health. The health records of the crêche are passed on to the kindergarten and the school to be followed up. The crêche exists wherever there are working mothers, including factories and collective farms. During the sowing and harvesting season when mothers work in the fields, mobile crêches are moved on to the cultivation areas. The State spends 600 rubbles per crêche inmate per month. The approximate budget for a crêche for 120 children is about 60,000 rubles per month. Groups of 15 infants are kept in separate rooms in order to prevent the spread of communicable diseases. B. C. G. vaccine is given at Maternity

Homes. Small-pox inoculation is given at the age of 8 months and diphtheria toxoid at 6 months.

Medical Services in Urban and Industrial Areas

The rapid development of industry, the construction of numerous mills and mines, and the growth of the urban population in the Union and Autonomous Republics stimulated rapid progress in the organisation of medical services in the cities.

A city is divided into several zones, districts or boroughs. A *District Hospital* serves a population of 40,000 to 50,000 population and has a bed capacity of 450 or thereabouts. In the population covered by a District hospital there are 10 zones, each with 4 to 5,000 people. We visited one District Hospital at Moscow and another at Alma Ata, capital of Kazakstan. The pattern is the same. These hospitals are very well-equipped, with x-ray plants and laboratories on every floor. Each patient is supplied with radio-earphone for recreation. These hospitals have medical, surgical and obstetric beds. There are 75 doctors for diagnosis and treatment and 50 doctors with public health qualifications in touch with the District health organisation. There are 140 nurses and 140 orderlies, besides clearing staff and dieticians. Many of these hospitals have a *Convalescent hospital* outside the city, called a Sanatorium, where patients, after discharge from the hospital, are rehabilitated for 2-3 weeks. These institutions are elaborately equipped with diagnostic and physiotherapy apparatus and are most generously staffed. In each hospital there is a *Board of Medical Control*, consisting of the senior staff, who analyse all cases staying in hospital for longer than 10 days, with a view to reduce the stay based on early detection, efficient care and prompt restoration of working capacity. In case of urgent surgical or emergency cases the patient first informs the Polyclinic, which immediately informs the Central Emergency Station which must make arrangements to take the case to the hospital, where a bed is vacant, within 20 minutes. The specialists immediately examine the patient and, if there is nothing to the contrary, the patient, in surgical cases, is operated within 15 minutes after arrival in hospital. If there is any violation of this, it is considered as neglect and the Town Council is likely to discuss the matter and recommend necessary disciplinary or organizational steps.

One or two *Polyclinics* are attached to each hospital. A polyclinic is a large medical centre which handles all cases which do not require immediate hospitalisation. There are at least 7 specialized departments in each polyclinic: internal medicine, surgery (including orthopœdics), gynæcology, oto-rhinolaryngology, ophthalmology, dentistry, neuropsychiatry, and, in malarial areas, a malaria section. Such a polyclinic is staffed by about 200 doctors. A polyclinic attends to over 10,000 population. Every effort is made to take specialised medical care closer to the population.

Peripherally radiating from the hospital and polyclinics are smaller medical centres, called *Ambulatoria*, which cater to a maximum of 10,000 people. A staff of usually 14 doctors examines patients at this centre and follows them up in the home. Many specialities are not represented in the ambulatoria but it gives medical, minor surgical, obstetric, gynæcologic, and dental care. It has a laboratory, x-ray apparatus, and equipment for physical therapy. If specialised care is needed, the patient is referred to the nearest clinic. Each factory has its own polyclinic, ambulatorium or dispensary according to the number of workers and complexity of its problems. These are connected ultimately with the district medical and public health organisation. There are Night Sanatoria attached to them for early or recovered tuberculosis cases. Minor ailments are attended to and health education work carried out at these clinics and those who need hospitalisation are admitted to the District Hospital. The factory population get a health check-up twice a year, while the rest of the population get it once a year.

Surrounding the Ambulatoria and Polyclinics are *medical or health stations* or smaller dispensaries which do not usually give specialist services, but they give complete medical service —preventive, diagnostic and curative—at the clinic and in the home. There is no restriction on home calls and no fees are charged. These centres undertake extensive health education of the people on personal, feminine and child hygiene and on dietary and prevention of communicable diseases. Apartment houses have *First Aid* and *Consultation Bureaus* and *Health Committees*, assisted by the Red Cross organisation. Thus the people participate in the health programme from the base to the apex of the health pyramid. Diagnostic and curative doctors and health personnel co-operate at all levels.

The organisation of the Polyclinic is indicated in Chart 1.

Rural Medical Services

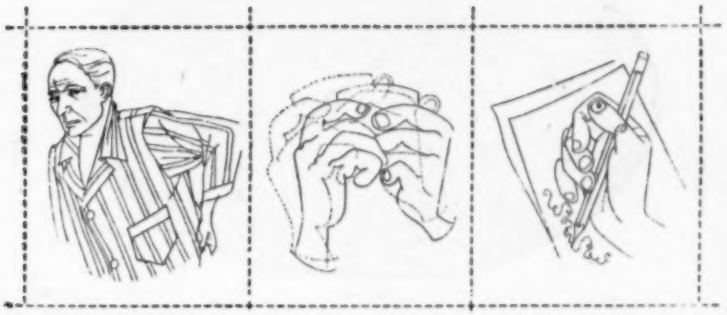
The reaching of medical services to every home in a predominantly agricultural country is a tremendous job. Although industry has advanced considerably in U.S.S.R., still 60 per cent of the population reside in rural areas. The face of the countryside has, however, been changed by the establishment of 12,000 State farms (=2 million workers) and 250,000 collective farms (=18 million workers), who cultivate 99 per cent of the farm area. These farms are modernised and have led to the development of well-organised villages and small towns. There is a tremendous amount of initiative for improving the economic and health status

Chart 1

Main Departments of a Polyclinic

Medical unit (at least 6 physicians with subsection for visiting Health Officers	*Surgical unit* (at least 4 surgeons) sub-divided into Sterilisation Room, Operation Theatre, Dressing rooms, Orthopœdic section, Traumatology section	*Obstetric & Gynæcological unit* (at least 5 doctors)	*Dental unit* (at least 5 doctors)	*Accessory Departments* Sterilisation, Laboratory, X-ray, Cardiology, Pharmacy, Therapy, Sectional Director's offices

new uniform oral dosage



in muscle spasm of rheumatic disorders | in acute alcoholism | in certain neurologic disorders

The new, uniform oral dose for adults is 1-3 grams. This may be repeated 3-5 times per day.

The first dose prescribed should be at the lower end of the recommended dosage range *(an occasional patient may complain of side effects when* large *doses are given at the* start *of Tolserol therapy).* Subsequent doses may be adjusted to the needs of the individual patient. Whenever possible, Tolserol should be given after meals. When Tolserol is given between meals, it is desirable that the patient first drink ⅓ glass of milk or fruit juice.

Tolserol

Squibb Mephenesin

Tablets, 0. 5 Gm., bottles of 25.
Intravenous Solution, 20 mg. per cc., 50 cc. ampuls.

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SARABHAI CHEMICALS, BARODA
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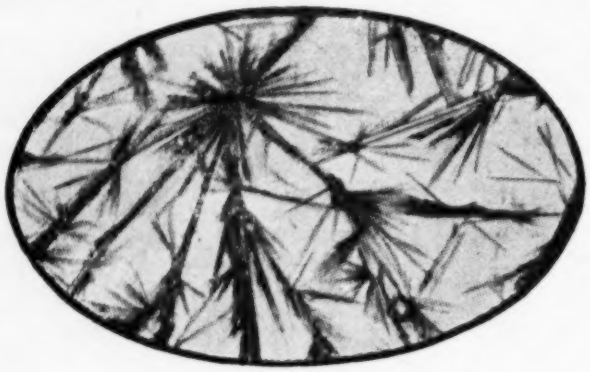

AZURENE

Isonicotinic acid hydrazide, the new anti-tuberculous agent with a specific utility in the treatment of pulmonary and extrapulmonary Tuberculosis:

- ★ Rapid defervescence
- ★ Improvement of the patient's general condition
- ★ Increase in body weight
- ★ Stimulation of the defensive power

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NAS 85/53

CHART 2

Soviet Russia

Regional distribution of medical institutions (excluding Internal Affairs, Defence and Transport Sections)

Republic
Krai (Territory)
Oblast (Region)—consists of 9-16 districts or raions

Rural areas
Raions (1/2—1 million population) consisting of a number of villages and towns)
Medical stations (Polyclinics) in Local Soviets (50,000 population)
Medical and Health Cells or circuits with 15-25 beds (4,000-5,000 population) Doctor, Nurse, Midwife
Medical aid posts
(Sanatoria and Health Resorts)
(Hospitals and Polyclinics)
—mostly at District level

Towns
(administered by City Soviets)
Raions = Boroughs each with its own Hospital (Inspector of Health) e.g., 10 raions in Moscow, 8 raions in Leningrad
Local Soviet
Medical Stations (Polyclinics and Ambulatoria)
Health Circuits
Dispensaries
Medical aid posts
(Sanatoria and Health Resorts)
(Hospitals and Polyclinics—organisationally interlinked)

Industry
(Factory or Local Committee)
Polyclinics and Medical Stations at factories—a branch of the District Polyclinic
(Sanatoria and Health resorts)
(Hospitals and Polyclinics—organisationally interlinked)

CHART 3

Structure of Soviet Medical and Health Organisation

Ministry of Health

(with several deputy ministers)

Collegium
Scientific Medical Council (with specialists)
Technical Council (for utilisation of inventions)
Secretariat
Legal consultation
Complaints section

Dept. of Education (Chief Administrator)
Med. Education (6 yrs.)
Middle Med. Education (4 yrs.) (Medical Technicians)
Nursing Education (4 yrs.)
Lab. Technician (2 yrs.)
Dentistry—higher (5 yrs.)
Dentistry—lower (3 yrs.) (Technicians)
Pharmacy—high (5 yrs.)
Forensic chemistry
Nutrition
Health instructors and visiting nurses
Health Education
Post-graduate education
Refresher training
Medical and Health Res. (300 Institutes)

Dept. of Capital construction and Planning
Finance and Economy
Supplies

Chemical-pharmaceutical industry
Medical instrument and appliances manufacture
Defence (Medical) industry
Defence (Medical) services

Division of Epidemiology and Sanitation

(Inspection service)

Housing
Food and Catering
School Health
Industrial Health
Venereal Diseases
Anti-epidemic institutions and service
Disinfection, insect and rodent control
Railway and transport sanitation
Port Sanitation
Other sanitary services

Medical Statistics
Forensic Medicine
Hygiene Institutes
Bacteriological Institutes
Anti-malaria section
Health resorts and sanatoria
Maternity homes, Women's and Children's consultation centres
Children's institutions, Creches
City and rural hospitals
Polyclinics and Ambulatoria

among them. They organise health committees and co-operate fully with the State's efforts to improve health and to prevent diseases.

We had a glimpse of rural medical organisations partly in the Moscow region and partly in Kazakstan. It is difficult to describe the organization without knowing the Soviet administrative structure. The following pages will, however, give some idea of the broad outlines of the medical services.

A Republic is divided into *Districts*, each with a population of half to one million. The District Health Department is in charge of all medical services of the district; preventive, diagnostic and curative. The District Health Officer is responsible for the functioning of the services and for health conditions among the population. He has to visit the institutions under his care several times in the year. Directly under and attached to the Health Department is a Director of Medical Services who controls all branches of the unit. The type of institutions is more or less as in the urban medical services, except that the medical centres (Medical Stations, Polyclinics, Ambulatoria and Medical Circuits) have a number of beds attached to them; the aim being to provide 10-11 beds per 1,000 population. The medical centres are equipped for all types of services, for men, women and children, including dental, laboratory and x-ray services. They have an ambulance service and send out doctors to the villages. The Medical and Health cells or circuits service 4-5,000 population. At the extreme periphery are *Medical Aid Posts* staffed by a doctor, a midwife and a health nurse. The rural doctor and his assistants also attend to matters of sanitation in their circuits, especially with regard to inspecting and securing improvements in the water supply, housing construction and village amenities. The salary of rural doctors and auxiliary workers is 25 per cent or more higher than those of equal position and experience in cities.

A rural health centre serves as a clearing house for cases to be treated by specialists at higher centres. For remote or inaccessible places, specialist squads visit them by mobile units or ambulance aeroplanes. Maternity homes and aid centres are located in farms at a distance of every 3 or 4 miles, so that, in case of need, difficult cases may be attended to at the higher centres above. Even the remotest health centres are equipped with laboratory and other scientific services. In this way, modern scientific diagnosis and treatment are taken to the whole population.

The structure of Rural Medical Service outside of the District Centre is shown in Chart 2.

Rehabilitation: Health Resorts and Sanatoria

It has already been stated that, in order to restore and preserve people's health, the District Hospitals have Convalescent Homes or Sanatoria attached to them. Rest houses at health resorts have been constructed around a large number of the 3,000 mineral springs existing in the country. A large number of Sanatoria similarly exist in other parts of the country. These Sanatoria are equipped with all diagnostic, dental and electrotherapy apparatuses, having large grounds and swimming pools. The State maintains them, while the Trade Union funds help the workers to avail themselves of these facilities. Vacations with full pay are offered for this purpose. 500,000 people can avail themselves of these facilities at any given time.

Corrective physical culture is being applied more and more frequently in the factories in order to counteract the evil effects of certain occupations and to increase the productivity of labour. In many factories, the day's labour begins with physical exercises, and gymnastic periods of from 3-5 minutes are held during working hours. Physical exercise has become a part of the process of production. Work is balanced by rest, for labour power spent in the process of production has to be re-created.

Social Insurance

Social insurance in U.S.S.R., in addition to the above facilities for all workers, salaried people and wage earners, covers the following:—(a) medical care, (b) benefits in case of temporary disabilities (sickness, accident, quarantine, pregnancy, childbirth and nursing a sick member of the family), (c) additional benefits for infants, funerals, etc., (d) unemployment benefits (since unemployment is virtually non-existent, this portion of the funds is spent for other purposes, such as improvement of medical care and establishment of health stations), (e) invalidity pension, (f) old age pensions, g) pension to families in case of death of bread-winner. Social insurance benefits extend not only to the insured workers but also to their dependents.

Medical and Health Workers' Trade Union

The all-Union Trade Union of medical and health workers was formed in 1934, which is affiliated with the All-Union Central Council of Trade Unions. Almost 99 per cent of workers are members of it and they contribute 1 per cent of their wages to meet the costs of the organisation and the social welfare needs of members and their families. This Union co-operates closely with the health authorities and is instrumental in the determination of wages and working hours. The working hours are 4-6 for physicians, 4-7 hours for junior doctors, midwives and nurses, and 6-8 hours for the lower personnel. The number of working hours varies with the specific occupation. For example, the medical personnel of psychiatric and tuberculosis workers, of x-ray and similar institutions, and of those working at night have the shortest duty periods.

The Production of Drugs and Instruments

In Tsarist Russia, 98 per cent of the drugs and instruments used to be imported. As a result of the visits to various hospitals, factories and research institutes, we have formed the impression that 99 per cent of them are now being manufactured in the country, including antibiotics and highly delicate instruments. Formerly the Ministry of Industry was in-charge of this Division, but since the last five years the Health Ministry has taken it over. This has improved the situation considerably.

Structure of the Health Ministry

Chart 3 gives, in brief outline, an idea of the organisational structure of the Health Ministry. There are several Deputy Ministers under the Health Minister. The Minister of Health is assisted in his work by the Collegium and by the Scientific Medical Council. The Collegium is an advisory body in administrative matters consisting of the Minister, the Deputy Ministers, the President of the Medical Workers' Union, the head of the Bureau of Finance of the Ministry, and a peasant delegate. The Planning Commission is connected with it. The Scientific Medical Council is an advisory body in scientific matters, consisting of distinguished research workers and specialists in major subjects. The Technical Council studies the problems and discoveries made either in the laboratory or in the field and advises on the utilisation

of inventions for the whole population, after pilot plant studies are made.

Some departments are directly controlled. In some methodological leadership is maintained. In others, organisational connection is kept. The general principle followed is "centralised discretion and decentralised activity." Health administration, like every other branch of Soviet activity, has assumed the form of a pyramid with an exceedingly broad base. Approximately 25-35 per cent of the total budget is devoted to medical and health improvement. This has to be considered in the background of other amenities, such as free education, social assurance, low rate of income tax (3-10 per cent of the income), etc.

NOTES AND NEWS

TB SEALS SALE CAMPAIGN IN INDIA

Dr. A. P. Mitra, Hony. Joint Secretary, I.M.A., has issued the following appeal to the Hony. Secretaries of all Provincial State and Local Branches of the I.M.A.

"The next Tuberculosis Seals Sale campaign commences on the 2nd October, 1953. The Tuberculosis Association of India and its affiliates in various States will be approaching you for help in this connection and I shall be obliged if you will kindly do your best to make the Tuberculosis Seals Sale Campaign a success."

CONFERENCE OF INDIAN ASSOCIATION OF PATHOLOGISTS

The Fourth Annual Conference of Indian Association of Pathologists will be held in Gwalior, November 20-22, 1953. Besides the papers on Pathological Anatomy, Histology and Physiology, Bacteriology, Parasitology and Immunology, one session each of the conference will be devoted to 'Tumor Seminar,' and a 'Symposium on Liver Injury.' Further information may be obtained from the Professor of Pathology, Medical College, U.P.

ALL-INDIA PEDIATRIC CONFERENCE

The 5th All-India Pediatric Conference will be held in Delhi in the first week of February, 1954. Invitations have been extended to pediatricians and child health workers all over India to attend the Conference and participate in its deliberations. Papers on child health particularly on the following four principal subjects are expected to be read:

I. Social and Preventive Pediatrics. II. Problems in the Management of the Newborn. III. Normal Growth and Development. IV. Diarrhoeal Diseases.

Summaries of papers intended to be read must reach the Hony. Secretary, Indian Pediatric Society, 56/2, Creek Row, Calcutta 14 on or before the 30th November, 1953.

NATIONAL GASTROENTEROLOGICAL ASSOCIATION

The National Gastroenterological Association will hold its Eighteenth Annual Convention and Scientific Sessions at The Biltmore Hotel in Los Angeles on October 12, 13 14, 1953. The programme will include a Symposium on Cirrhosis of the Liver; Panel Discussions on "Peptic Ulcer"; "Diseases of the Large Bowel" and "Latest Developments in Cancer Research". There will be additional papers on interesting subjects in gastroenterology and related fields.

Following the Convention, on October 15, 16, 17, 1953, the Association's Fifth Annual Course in Postgraduate Gastroenterology will be given at The Biltmore Hotel and the College of Medical Evangelists in Los Angeles.

Detailed information may be obtained from the Executive Officer, National Gastroenterological Association, 1819 Broadway, New York 23, N. Y.

LEPROSY NO VALID GROUND FOR DISSOLUTION OF MARRIAGE

In the Hindu Marriage Bill, leprosy has been made a valid ground for dissolution of marriage, though it is a curable disease. The Indian Association of Leprologists, Leprosy Department, School of Tropical Medicine, Calcutta, is of opinion that divorce on ground of leprosy is unscientific and unjust. In a booklet on this subject just published, the association asserts that "neither on the ground of infectivity nor on the ground of incurability can leprosy be stigmatised as a valid reason for dissolution of marriage. Comparatively limited number of patients develop deformity. But on that ground also, leprosy cannot be singled out for punishment as so many other diseases also cause deformity, ulcers and disfigurement. If leprosy is allowed to be a ground of divorce, it will in effect put a ban to all marriages in the affected families and also encourage concealment of the disease as long as possible, causing a setback to the efforts of doctors and social workers to conquer this social disease.

CORRESPONDENCE

The Editor is not responsible for any views expressed by the contributors

HAEMATOLOGICAL STUDIES IN NEWBORN INFANTS

SIR,—I shall be obliged if you kindly add the following lines under subheading Acknowledgment at the end of my article "Haematological Studies in Newborn Infants" published in the June 1953 issue of your esteemed journal (*J. Indian M. A.*, 22: 335, 1953):

"I am indebted to Lt.-Col. S. C. Roy for giving me facilities to work in his laboratory for 8 months and for his most friendly and sympathetic attitude, to Dr. R. K. Sen Gupta, Pathologist, Howrah General Hospital, for giving me a corner in the laboratory and the help I required, to Dr. Jyoti Dhar for his enlightening me about the nature of work he had published and to the Resident and Nursing Staff of the Howrah General Hospital for their co-operation. I owe a deep debt of gratitude to Dr. G. C. Nandi, Senior Visiting Surgeon, Howrah General Hospital, for his ever encouraging and kind behaviour".

It is regretted that these lines were not included in the acknowledgment through mistake. I am, etc.,

Howrah. BHOLA NATH BANERJEE.

CONDENSED M.B., B.S. COURSE FOR TEA GARDEN DOCTORS

SIR,—The president, Assam Medical Conference at Nowgong suggested that seats for condensed course in medical colleges "should be distributed equally amongst (1) tea garden doctors, (2) private practitioners and (3) doctors in service of Government and local bodies".

Regarding condensed M.B. B.S. course for tea garden doctors resolutions also were adopted both in Circle and Provincial Tea Employees' (Assam Chah Karmachari Sangha) Conferences with no effect. India Government wants uniform medical standard all over the country. The Central Health Minister has already requested all to sanction full facilities to licentiates—who wish to take up the condensed M.B. B.S.

course. Provincial Governments have already granted study leave with other facilities to their intending doctors. A few employers in tea industry also sent their doctors for the said course to honour the request made by our Central Health Minister. But the noble plan of our National Government is going to be frustrated as most of the tea garden owners are not striving to make it a success.

I appeal to leaders of the I.M.A. including those of Assam to give due considerations to the above facts during the ensuing Provincial and All-India Conferences of I.M.A. and bring this to the notice of both the State and Union Governments who should impress upon the tea industry for proper implementation of the same.—I am, etc.,

Gohpur, Assam. (Dr.) S. R. Dhar,

REVIEWS

THE PLURIPOTENCY OF THE HYPOPHYSEAL HORMONES AND THE CONSEQUENCES FOR ENDOCRINOLOGY AND CANCEROLOGY—By Dr. Jules Samuels, Ed. N. V. Cycloscoop, Amsterdam, 1953. pp. 297.

The author starts with a presumption that each cell secreting a specific substance produces one substance only and "never two or more". As there are only two types of secretory cells in the pituitary, the organ can secrete but two hormones. These have been differentiated by the author by spectroscopic and electrophoretic and other methods. One of these hormones is secreted by the basophil cells and is identified as the gonadotrophic hormone. Its principal function is to encourage cell-division and retard cell respiration. The other pituitary hormone comes from the eosinophilic cells and possesses a thyrotropic property besides being a stimulator of cell enlargement, growth and cell respiration. The author provides clinical and experimental evidence in support of these views and interprets the work of other investigators along these lines. Cell proliferation is stimulated not only by the gonatotrophic hormone of the pituitary but also by the ovarian follicular hormone. This latter has been described by the author as the second proliferation hormone. Normally a balance is established between the cell-proliferating and retarding hormones on the one hand and cell-enlarging and accelerating factors on the other. On this basis the author explains cellular hyperplasia and neoplasia. On this basis the author described a form of short-wave radiation treatment of the pituitary for the control and cure of neoplastic processes including malignancy. The aim of this form of treatment is to make the basophil cells produce an increased quantity of endogenous gonadotrophic and retarding hormone by suppressing the thyrotropic or accelerating hormone

The bihormonic status of the pituitary has been stated by Selye also who groups the pituitary hormones into somatotrophic and adrenotrophic principles. Up till now more than a dozen hormones have been attributed to the pituitary, and an attempt at the simplification of the subject is understandable. The book is well-written and the arguments put forward are reasonable. Nevertheless the conception is so utterly different from the standard and accepted views on the subject that the book requires careful study before the author's views can be accepted. The work itself requires verification and confirmation. Research investigators interested in the pituitary hormones may find the book useful. The printing and get-up are satisfactory.

A TEXT BOOK OF MENTAL DEFICIENCY (AMENTIA)—By A. F. Tredgold, assisted by R. F. Tredgold. Eighth Edition, 1952, Pp. xvi—546, with 48 plates. Bailliere Tindall & Cox; 7 & 8 Henrietta Street, London, W.C.2. Price 37s. 6d. net.

The author of a medical textbook is not often fortunate to have the assistance of his own son in the preparation of a book or one of its subsequent editions. The long experience of Dr. A. F. Tredgold has enabled him to produce this textbook which has proved its usefulness by running into the eighth edition. The previous edition was published in 1947, reprinted again in 1949 and now we see a revised new edition. This is a very good textbook on the subject. The appendix at the end of the book will specially benefit the beginners in the speciality. The numerous illustrations and extracts from notes of personal cases make the reading of the book more interesting. A good textbook which will benefit the reader.

FOUNDATIONS OF NEUROPSYCHIATRY—By Stanley Cobb. Fifth revised and enlarged edition of the work formerly known as "A Preface to Nervous Diseases". pp. X—287, with 15 figures. The Williams & Wilkins Company, Baltimore, U.S.A., 1952. British Agents: Bailliere Tindall & Cox; 7 & 8 Henrietta Street, London, W.C.2.

In his 'Foreword' the author makes it clear that the book is only a "preface" to start the student in a three-dimensional orientation towards neurology and psychiatry. In other words this book is intended to be a brief, concurrent anatomy, physiology and pathology leading upto a description of the principal disease entities. This book will give the practitioners and students of medicine the facts and correlations needed to understand the simpler workings of the central nervous system. The author has an experience extending over a quarter of a century in the teaching of students in neuropathology. The subject matter is clearly described, nicely developed and easy to grasp. The author amply succeeds in his task and the book should prove a help to practitioners and students alike.

LUMBAR DISC LESIONS: PATHOGENESIS AND TREATMENT OF LOW BACK PAIN AND SCIATICA—By J. H. Armstrong with a foreword by H. Osmond-Clarke, 1952. Pp. 226 with 56 illustrations including several in colour. E. & S. Livingstone Ltd., Edinburgh & London, 1952. Price 42s. net, postage extra.

Painful disorders of the lower part of the back is quite a common ailment and there is hardly any group of ailments which requires such careful evaluation when planning the treatment as the lesions of the lower intervertebral discs. To some casual observer it might appear that "disc lesions" are becoming more and more frequent nowadays. A little careful analysis, however, shows that this is not really so. For, patients who suffered in silence with their "lumbago" or "fibrositis" ten years ago, are the very ones who to-day go about talking their disease as a high sounding "slipped disc"! Mr. Armstrong has had extensive experience with numerous cases with various manifestations of this disease. The present monograph is the product of accurate and inquisitive clinical observation, a comprehensive survey of the literature and an experience of more than a thousand well documented operations. Paper, printing, binding get-up and method of presentation are excellent. The book should be read by all concerned and should be in the bookshelves of operating surgeons dealing with these types of cases.

SUPPLEMENT

Journal of the Indian Medical Association

VOL. XXIII, No. 1 CALCUTTA OCTOBER, 1953

XIX ANDHRA PROVINCIAL MEDICAL CONFERENCE, MASULIPATAM

The 19th Andhra Provincial Medical Conference was held in Masulipatam on the 2nd and 3rd of May 1953. Dr. Bhagavantham, Vice-Chancellor, Osmania University inaugurated the conference and Dr. E. S. Reddy presided over it. The Industrial and Public Health Exhibition was opened by Dr. B. Tirumalrao. The scientific session was presided over by Major K. N. Rao, and it was inaugurated by Dr. P. Arunachalam who delivered a lecture on "War on Tuberculosis". The following were the speakers who took part in the scientific session, (1) Major K. N. Rao on Recent Trends in treatment of diseases. (2) Dr. K. Sitapati Rao on Emotional Factors in Tuberculosis. (3) Dr. M. Krishnamurthy on Sterility and its Investigation (4) Dr. P. Seshagirirao on Early Diaposis of Cancer (5) Dr. A. Narayanrao on Vaccine Therapy in Typhoid fever (6) Lt.-Col. T. S. Sastry on Experiments in Diabetes and thereafter (7) Dr. M. V. Krishnamurthy on Symposium on Venereal diseases.

Dr. P. S. Chalapati Rao, the Chairman of the Reception Committee in his welcome address described in detail the history of the place, its past glories and achievements and its present problems. He also suggested improvements.

Dr. E. S. Reddy in course of his presidential address said:

"It is agreed by the National Planning Commission that every scheme of national development must include some measures for health planning, which aims at the creation and maintenance of personnel and community health services on a scale to meet the requirements of the people.

The Health and Development Survey Committee during the last stages of World War II have covered a large field and proposed long and short term programmes for the reorganisation of the Health Services. Primary Health Centres at the periphery, Taluk centre with higher medical services and specialised services at the District Head Quarters were recommended. To implement the above, the States and the Centre may have to commit themselves to heavy expenditure far beyond their capacity in the present state of affairs. The Planning Commission have therefore suggested the reorganisation and readjustment and further expansion of the existing facilities. They laid stress on the expanded preventive work, free D.D.T. spraying for the control of Malaria, B.C.G. vaccination for the prevention of T. B., increase in the number of maternity beds for maternity relief; establishment of pre and post-Natal clinics for child welfare work; replacement of untrained Dhais; imparting of health education; development of physical education; improvement of vital statistics; and family planning, as measures to be adopted during the first five year period.

Medical Relief:

In order to implement conditions in Health Planning in both urban and rural areas, more qualified doctors are required. The number of doctors in urban areas is fair, but in the rural areas it is very inadequate. Though it may not be possible to achieve the ideal as stated in Bhore's Committee report, we have to provide at least one doctor for every population. At this rate we require about 3,200 qualified doctors for the 16 million rural population, against which there are only 800 available. There is therefore urgent need for about 2,400 doctors to supply the bare medical needs of the rural population. With a view to supply this deficiency in five years period we require at least five medical colleges in our area. There is only one medical college at Visakhapatnam for 75 students. It is therefore highly necessary that the medical college at Guntur should be expanded and teaching to the final M.B. & B.S., stage be given, and three more new colleges started in our Andhra State.

DR. S. BHAGAVANTHAM INAUGURATED THE CONFERENCE

With a view to relieve the shortage of personnel, measures for the shortening of the medical course, and shift system in the existing medical colleges were proposed. Shortening, of course, will result in inefficiency and the problem cannot be solved by this measure. If cheapness and efficiency can be combined, it is good; but cheapness shall not be obtained at the cost of efficiency.

The shift system is very inconvenient both for the teachers, students and patients in hospitals. Those who have experience of this shift system in the arts colleges will never recommend it for any college, much more so for professional colleges.

There is only one way of overcoming the present shortage, i.e., by opening new medical colleges and teaching students without lowering of standards.

Medical Education:

One uniform standard of medical education has been recommended by Bhore's Committee. Some States have introduced a hybrid system of medicine. It leads to licensed quackery. It is therefore not advisable to combine two different systems which have no common measure. Our

people are becoming more and more enlightened. The demand for qualified doctors is increasing. A time may come when quackery will vanish from society. In order to satisfy the demand the only solution is by opening new colleges and training large number of students.

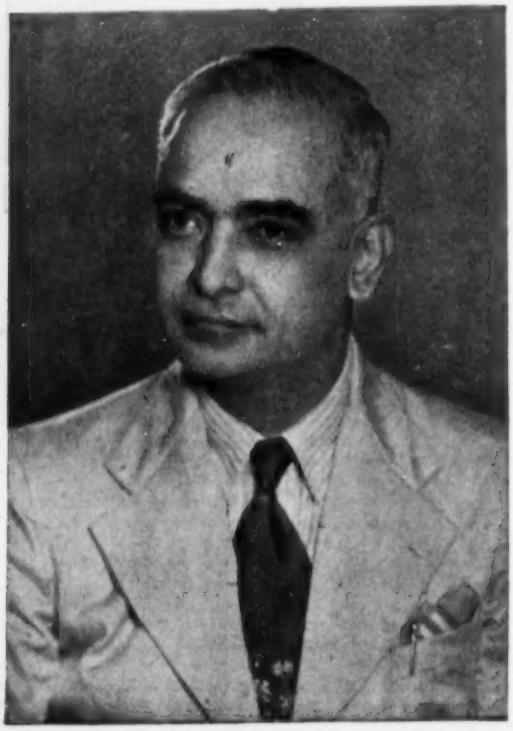
Medical Research and Post-Graduate Training:

Few medical college provide facilities for research and post-graduate traininng. It is necessary that every medical college should have a research section. Mere under-graduate training will not add to the advancement of the medical science. Absence of research may lead to stagnation and may slowly bring about lowering of standards, not an end to be wished for.

There are very few institutions which provide for post-graduate training. Due to lack of facilities, the State and Central Governments have been sending batches of medical personnel abroad for post-graduate medical training. The majority of those sent abroad have in view only the passing of Degree and Diploma examinations. The chief objective of learning post-graduate work is lost sight of. It is high time that our State, Central and University authorities should devise a new policy based on the present requirements and their economic condition. Instead of sending medical personnel abroad, young men of merit should be encouraged to undergo post-graduate training and acquire post-graduate qualifications available in this country. Suitable candidates from among these may be selected and sent abroad for holding internships and residencies in well known hospitals. The experience gained by such trained personnel should not be allowed to run waste. The Government should utilise their services to the best advantage in our country where there is dearth of such talents.

Upgrading of Medical Education:

In 1949 the Government of India appointed a special committee to recommend certain centres to be upgraded for specialised studies in certain branches of medicine. As a result of the recommendations, certain departments in some of the medical colleges are being upgraded. The Madras Medical College and Stanley College, had a share in this allocation. It is unfortunate that Vizag Medical College, the only one in our area has been lost sight of. I hope this defect will be remedied soon and some department will be upgraded.



DR. P. ARUNACHALAM INAUGURATED THE SCIENTIFIC SESSION

Refresher Course:

Once a candidate passes the examination and takes up an appointment in the moffasul areas, there are very few chances for some to be in touch with the latest developments in the medical science. With a view to enlarge his knowledge and thereby give benefit to his patients, it is necessary that he is allowed to undergo refresher course for three months once in every five years at least at the nearest Headquarters Hospital which should be well equipped. This is essential in the larger interest of the general public.

Our Hospitals:

Ours are far inferior to those in the South. With the exception of one, there is not one District Headquarters Hospital with a bed strength of 250 in the Andhra Districts. Even the King George's Hospital at Vizag is not comparable with those in the Madras City. It is urgent and imperative that our Headquarters Hospitals should be remodelled and expanded so as to have a bed strength of at least 250. Unless this is done, it may not be possible to serve the immediate needs of the local population. Special beds must be provided for treatment of certain diseases.

Our total bed strength is very low. There are in all about 3,500 beds for the whole area, having 20 million population. This works out at one bed for every 6,000 people. This is very unsatisfactory. Some of our Taluk Headquarters Hospitals exist only in name and have no emergency beds even. There is immediate necessity of enlarging bed strength. In the course of five years the bed strength may be trebled at least, each Taluk Headquarters hospital being provided with 50 beds.

Much of the success of our hospitals depends on the nursing system that can be provided and on the ability of our nurses who should be well trained and well equipped.

At present there is paucity of nurses. Attempts must be made to enlarge the number. With the spread of education, there is every likelihood of our obtaining adequate number of hands. Only the prejudice against the profession should be overcome by propaganda and attractive terms of service.

Drug Manufacturing and Control:

The one charge that is levelled against scientific system of medicine is that it is very costly. Any efficient treatment is bound to be costly. If we analyse the factors which add to the cost of this treatment, it will be seen that drugs form the largest part. It is therefore necessary to have the drugs at a low cost which cannot be expected, unless all are manufactured in our country. At present we depend mostly on imports for the drugs. There is intensive traffic in spurious drugs. The Government are blind to their own responsibility and have made no serious attempt to bring this traffic under proper control. It is high time that State Governments should start drug industry. It is glad news to learn that the Central Government, in co-operation with the World Health Organisation, have decided to start factories for the manufacture of Penicillin and D.D.T.

Ante-natal Centres:

This means organisation of ante-natal, natal clinics and establishment of child welfare centres on a wider scale than at present. Lack of these facilities is a contributory cause for high infantile and maternal mortality. To remedy this state of affairs, nothing worth the name has been done either by our Government or by the public. There is lack of qualified hands, and great reluctance and prejudice are shown by respectable educated girls for this type of work. These prejudices should be overcome by propaganda and attractive terms of service and conditions of work Better emoluments and treatment will induce many to take up this service in their home areas. Early arrangements may therefore be made for the opening of a network of child welfare and maternity relief centres.

Planned Parenthood:

It may not be out of place to refer to planned parenthood. Due to ignorance and superstition there is great opposition to this healthy and well deserving move. The unspaced and unwanted frequent child births lead to high maternal and infantile mortality, and cause deterioration in national health. Birth control is necessary and essential for the lowering of general death rate. A high birth rate will lead to over-population and a low average life, and hinders economic progress. Every hospital should have a department attached to it to give instructions on the subject to the people; and all maternity and child welfare centres should educate our women on the necessity of planned parenthood.

School Child and Medical Inspection:

The children of to-day are citizens of to-morrow. It is highly essential that the child's health should be looked after in all its growth. School children should be periodically examined by competent school medical officers, and any defects, nutritional, physical or mental, should be remedied. At present there is no compulsory medical examination of our school children, with the result that the defects and predispositions to disease are allowed to grow. In order to give good facilities favourable for healthy development of our children, a systematic medical inspection should be made compulsory. A small fee, if necessary, may be charged. In this connection I will suggest that every school of 1,000 and more pupils may be compelled to have a full or part-time medical officer in its establishment. If one school cannot afford it, two or more in the locality may be combined for this purpose. There should be follow up of the child into its adolescence and medical care given for its well being.

Preventive Medicines:

Many diseases which are contagious and are causing high mortality can be prevented by improvement in environmental hygiene and personal prophylactic methods. Much attention is not yet paid to the primary needs like water, housing and food. Good drinking water is a necessity for human life and for the upkeep of health, the supply of which is a primary duty of the State and the community. Good housing programme is also essential for the preservation of health of the community. Our housing conditions are very poor at present. The existing ones are ill-ventilated and have insanitary surroundings. Unless there is general improvement of sanitation, there can be no improvement of health alround. The State should therefore concentrate on the programmes of water supplies and housing both in the rural and urban areas.

Food is a potent factor in the maintenance of health. For the health and welfare of the community, good and nutritious food must be made available in abundance at moderate costs. We are now faced both with shortage of food material and absence of protective materials essential for life and health. Milk so essential for child's health and life and cereals are in short supply. In our country which is so abundant in cattle, it is a pity that milk should be in short supply, and we are made dependent for foreign imports of milk powders and the like products. With a view to overcome the deficiency in our cereals, leaders have rightly taken up river valley projects and it is hoped that when these schemes are completed there is every likelihood of surplus of food material and better nutrition will prevail.

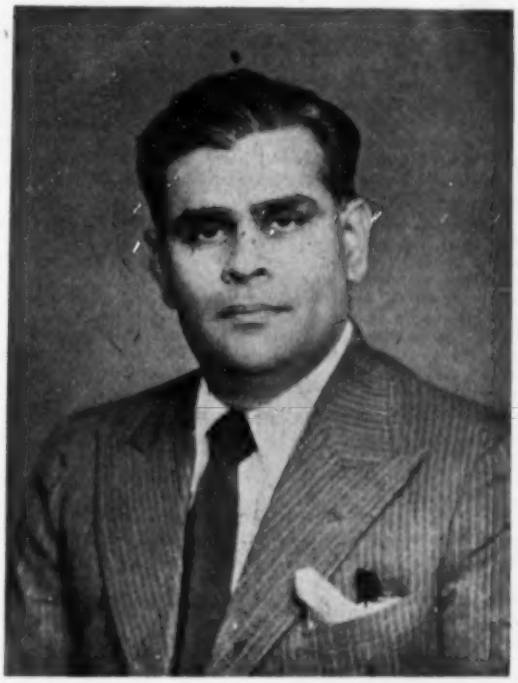
Tuberculosis and Malaria:

Malaria which is due to bad sanitation can easily be prevented by modern methods of systematic and continued D.D.T. spray. Once heavy malarial areas like Wynad and Araku have been made healthy and habitable and more prosperous. When prevention is possible, early steps should be taken for the prevention of this disease which is the cause of a million deaths in our country. For the treatment of Malaria, Quinine is necessary. We produce large quantities of this drug, but not adequate. Steps should therefore be taken for self-sufficiency.

Another disease of great havoc is Tuberculosis. Compared to the last two decades, the disease has become very rampant. Its toll is colossal. Early steps should be taken to eradicate it. Otherwise its effects will be very gloomy. It is said that nearly 2 per cent of our population are infected. It may not be possible to isolate all these cases. But every effort should be made to reduce the chances of infection by educating the patient and the public in the proper disposal of sputum.

Of late B.C.G. vaccination has come into prominence. Arrangements may be made for its wide application to protect people from this disease. We are glad to note that the Government is making efforts to endorse B.C.G. vaccination.

Sanatoria are necessary for the treatment and prevention of the disease. Though our State has been making efforts to provide Sanatoria by giving subsidy to private charitable ones, the number that is now available is very inadequate. At least one Sanatorium for every district with a bed strength of 200 is necessary. State should encourage both private Sanatoria by giving 50 per cent building grant and for maintenance, besides having their own in select areas. There is only one State Sanatorium of beds in the Andhra districts. The State Government may take early steps to enlarge it to 200 beds.



MAJOR K. N. RAO PRESIDED OVER THE SCIENTIFIC SESSION

Tuberculosis is intimately associated with economic prosperity and nutritional condition of the community. It must therefore be our aim to improve the nutritional condition of our people, which in turn can be achieved only by economic development. Our River Valley and Community Projects which were started by our Government may bring about this change and we hope that this disease will be controlled to a large extent.

As the seeds of this disease are implanted in childhood, and signs remain latent till adult life, steps should be taken to protect our children from getting infected. In the present stage there is only one way of doing it, that is, by extension of B.C.G. vaccination. Early enforcement of this measure is very necessary in the interest of the welfare of the community.

Ancillary Services:

The Ancillary services of dentistry are not so well developed in our country as in the other civilised countries. It is necessary that this should be developed and it is hoped

that the recent Dental Registration Act will be a forerunner for better state of affairs.

Compulsory Health Insurance Scheme:

It is necessary for the maintenance of the community health that some type of insurance scheme should be introduced. There may not be much use in introducing the scheme on a wide scale throughout the length and breadth of the State. In the present shortage of medical personnel and lack of medical relief, the scheme will remain a dead letter. Instead the scheme may be made compulsory in some select areas like our industrial centres and urban areas where there is adequate medical personnel. The scheme is said to be working well in Kanpur and Delhi, two important centres. It is time that this scheme is extended to our areas also. There will be defects in the initial stages and there will be much scope for improvement. With experience these defects will be remedied and improvements effected.

Socialisation and Panel System:

The modern tendency is socialisation of medical men. So far as our country is concerned, it may be too early to think of this measure. When there is shortage of personnel, socialisation may not work effectively. But this will be the ultimate goal.

In the present conditions, Panel system may be thought of, at least in our urban areas, where there is no dearth of doctors. This is likely to lead to better health and treatment of patients, and also to good understanding amongst the professional practitioners. At least the unhealthy competition will be removed and healthy co-operation may be established. This is worth trying.

There is only one thing which I would like to place before you before I close. It gives me no encouragement when I see that many of our brothers have not yet enrolled themselves as members of the Indian Medical Association. I appeal to all to become active members of this Association. This organisation is the most representative national organisation of our medical profession. It is also a member of the world medical association. It is only through united front that we can uphold the dignity of our profession. So this organisation has a great part to play in future in the matter of public health."

RESOLUTIONS PASSED AT THE CONFERENCE

This Conference places on record its sense of sorrow at the demise of Dr. A. K. Sen, Dr. H. Satyanarayana, Dr. G. Sivaram, Dr. P. Ratnaswamy, Dr. T. Satagopan and convey its condolence to the members of the bereaved families.

1. This Conference recommends to the Government to treat the days of journey and attendance at the I.M.A. meetings either in the District or in the State as on duty instead of treating it as casual leave.

2. This Conference recommends to the Government for the reservation of 10 per cent of seats in the Medical Colleges for admissions of the sons and daughters of the Medical practitioners and Officers in the State.

3. The Provincial Branch views with concern the proposal of the Government of Madras for the shortening of Medical course with a view to increase the number of Medical practitioners, and opposes this move, as it will bring about deterioration in the standards of medical education and will lead to quackery.

4. This Conference recommends to the Government that the subsidy of the Rural Medical Practitioners of modern medicine may be raised to at least the minimum salary of the Assistant Surgeons for attracting well qualified medical men as the present subsidy is low and unattractive and is an impediment for qualified men to settle down in the rural areas which are devoid of any amenities.

5. This Conference recommends for the provincialisation of all qualified medical officers employed in the Local Bodies or in the Municipalities.

6. This Conference recommends that in view of their long and satisfactory services, all the L.M.Ps. who have been served with a notice of discharge may be absorbed into regular service when vacancies arise in future.

7. This Conference recommends to the Government of Madras and to the Government of India for the upgrading of Pathology and Physiology in the Vizagapatam Medical College.

8. This Conference recommends to the Government that the Guntur Medical College be expanded and clinical courses be opened from 1953.

9. This Conference recommends for the introduction of compulsory medical inspection of the children in Secondary and Higher Elementary schools and arrangements for follow up may be made. If necessary a part-time Medical Officer may be posted for every School.

10. This Conference recommends to the Government for early introduction of Panel system in all urban and Municipal areas, as this will lead to better treatment of patients and will lead to healthy co-operation of the members of the medical profession.

BRANCH NOTES

ANANTAPUR BRANCH—A meeting was held on 27-6-53 with Dr. S. Sreeramulu in the chair. Dr. K. Raghavendra Rao presented the following interesting cases (1) Intra Ventricular Septal Defect of the Heart (2) Pseudomuscular Hypertrophy (3) Cerebral Diplegia.

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A meeting of the branch was held on 22-8-53. The members passed a resolution requesting the Andhra Provincial Branch to start a Godavari Flood Relief Fund for the relief of the victims. Dr. K. Raghavendra Rao spoke on "Surgery of the Heart."

ASSAM PROVINCIAL BRANCH—A meeting of the Working Committee of the branch was held on 24-5-53 to condole the sad death of Dr. A. K. Sen of Calcutta and Dr. Dhiren Bose of Dibrugarh.

BANGALORE BRANCH—A meeting of the branch was held on 9-5-53, Dr. M. Sirsi spoke on "A biological study of conception control". Miss Mary Langford of the Family Planning Centre of Ramanagaram presided. Sixty members were present.

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At a meeting held on 23-5-53, Dr. T. M. A. Pai addressed the members on "Medical Education". Dr. B. K. Narayana Rao presided.

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At another meeting held on 15-6-53, Dr. D. A. Laxman Rao presided and Dr. M. S. Mehkri spoke on his "Experiences of Eye Surgery in Rural Areas". Next Dr. S. R. Bombore spoke on the "Economic Aspect of Malaria Control".

BENGAL PROVINCIAL BRANCH—The Bengal Provincial Branch of the Indian Medical Association in its memorandum on the proposed implementation of the Employee's State Insurance Act in West Bengal, welcomed the Act in principle, inspite of its shortcomings and limitations. The Insurance Scheme, the Branch hoped would offer the employees a proper standard of medical care to meet the situation. In this connection, the Bengal Provincial Branch held that the fundamental principles of the "Panel System" should be observed by providing the insured persons free choice of their doctors. The Branch was of the opinion that doctors should be asked to give only professional services and that the arrangements for the supply of drugs, dressings and injection materials should be the responsibility of the Corporation. The Branch calculated the capitation fee for the panel doctor with respect to the following items: (1) Professional Service which works out as Rs. 5/6- per capita per year, (2) Medicine—Rs. 2/1/- per capita per year excluding the cost of phial and cork. The cost of special medicine is not included in it, (3) Establishment costs, minimum -/14/- per capita per year, (4) Conveyance, -/8/- per capita per year.

The Bengal Prov. Branch suggested that after working the scheme for one year, the position would be reviewed and a final assessment of capitation fee would be done.

The Branch also suggested that a regional board be established with representatives of E.S.I.C., State Government, I.M.A., Employers and Employees to consider the details viz. (1) minimum requirements of panel doctors (2) a formulary of ordinary and special medicines (3) selection of panel doctors (4) arrangements for laboratory and x-ray examination and hospitalisation, etc.

BERHAMPORE BRANCH—A meeting of the branch was held on 29-6-53. The members expressed their willingness to accept the enhancement of registration fee from Rs. 15/- to Rs. 20, as embodied in the resolution of Orissa Council of Medical Registration, provided the registered medical practitioners are assured of protection from exploitation by quacks in their practice.

BETTIAH BRANCH—A meeting of the branch was held on 5-7-53 with Dr. R. L. Banerjee in the chair. Twelve members were present. The meeting condoled the death of Dr. A. K. Sen of Calcutta. The members strongly condemned the publication of an article in Angar of Motihari. It was resolved that a deputation of doctors should wait on the medical and Public Health Ministter when he visits that area next time. The meeting held the opinion that the proposed scheme of amalgamation of the K.E.M. and M.J.K. Hospitals of Bettiah will be healthy and conducive to the people.

BHIMVARAM BRANCH—A meeting of the branch was held on 1-7-53. Dr. A. Bhavanarayana of K. G. H. Visakhapatam gave a lecture on Pulmonary Tuberculosis.

CHAIBASA BRANCH—A meeting of the branch was held on 30-6-53 with Dr. D. N. Roy in the chair. Eleven members were present. At the outset, the meeting condoled the sad death of Dr. Shyama Prosad Mukherjee. Dr. S. K. Samanta read a paper on "Vitamin A". As the branch incurred deficits in 1951-52 and 1952-53, the meeting decided to increase the membership fee from Rs. 9/- to Rs. 11/- per year.

CHETTINAD BRANCH—A meeting of the branch was held on 27-7-53 with Dr. D. O. Sendel in the chair. Dr. Horace S. Thomas gave a talk on "Medical and other aspects of life in Australia."

COIMBATORE BRANCH—A meeting of the branch was held on 30-6-53 with Dr. P. N. Ramaswami Naidu in the chair. Eighty members were present. Dr. (Mrs.) E. Rangala gave a detailed account of two interesting cases viz. (1) a case of Twins. (2) A case of Vaginal Attresia. A film on Some Problems in the management of Peptic Ulcer was also shown.

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A meeting of the Branch was held on 18-7-53. Dr. (Major) R. S. Rao presided. Dr. (Miss) S. Padmavathi spoke on "Hypertension and its Managament."

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A meeting of the branch was held on 6-8-53. Dr. P. N. Ramaswami Naidu presided. Ninety members present. The meeting expressed sorrow at the sudden death of Dr. K. Davanand a former president of the branch. Dr. R. V. Rajam spoke on "The Challenge of Venereal Diseases."

DELHI PROVINCIAL BRANCH—The branch in a meeting placed on its record its deep sense of sorrow at the sad and untimely death of Dr. A. K. Sen, the senior Vice-President and an active member of the Association.

DHARWAR BRANCH—A meeting of the branch was held on 28-6-53 to condole the sad and premature death of Dr. Shyamaprosad Mookherjee.

EAST GODAVARI BRANCH—A meeting of the branch was held on 27-6-53. Dr. B. Venkataraju opened the symposium on the treatment of Peptic Ulcer. Then Dr. N. Pantulu demonstrated the following cases (1) Coccal Dermititis, (2) Limpho-granuloma with stricture rectum (3) Secondary Syphilitic Rash and (4) Granuloma Venereum.

FEROZEPORE BRANCH—A meeting of the executive committee of the branch was held on 2-7-53 to discuss the questionnaire of the Pharmaceutical Committee of Government of India. The reply was drafted. The representatives of the various hospitals were present.

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A meeting of the branch was held on 15-7-53. Dr. Raja Ram Bhola presided. Twenty-two members were present. Dr. K. Motisingh spoke on "Anaemia" with demonstration of cases.

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A meeting of the branch was held on 28-8-53. Dr. H. Singh read a paper on Radio Medical Short Waves along with practical Demonstration.

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An extraordinary meeting of the branch was held on 30-8-53 to meet Dr. H. C. Shori, the President of the Punjab State branch who addressed the members on unity and discipline in the association.

FORBESGANJ BRANCH—The annual general meeting of the branch was held on 23-8-53 with Dr. A. Niranjan in the chair. The annual report was confirmed and the statement of accounts was passed. Office bearers were elected with Dr. H. N. Sarbadikary as president and Dr. S. N. Das Gupta as secretary.

GHUGUDANGA BRANCH—A meeting of the branch was held on 23-8-53 with Dr. S. S. Sarker in the chair. Ten members were present. Scientific discussions of various subjects were made amongst the members present.

GORAKHPUR BRANCH—The next provincial medical conference will take place in Gorakhpur by the end of October 1953. Uptodate programme will be announced shortly.

HASSAN BRANCH—A meeting of the branch was held on 30-5-53. Dr. R. Sundara Rao spoke on "Health Activities and Administration of Public Health in America." Case reports were presented by Dr. D. Shamanna and Dr. K. Venkatasubba Rao.

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A meeting of the branch was held on 27-7-53 with Dr. C. Achutan in the chair. Thirty doctors were present. The following subjects were discussed: (1) Ascariasis by Dr. S. K. Subha Rao (2) Case report on Splenomagaly by Dr. P. R. Venkatapattiah (3) Osteo Genesis in protent (4) E.S.R. Infection by Dr. V. K. Deshmukh (5) Abstracts by Dr. A. Shammanna.

HOOGHLY-CHINSURAH-CHANDERNAGORE BRANCH—A meting of the branch was held on 26-5-53. Twenty-three doctors were present. Two scientific films on ACTH and Trypter were shown. A case regarding the death of a patient in Hooghly Imambarah Hospital was discussed. The president and the secretary of the advisory committee of Imambarah Hospital were requested to include representatives of the association in the said committee.

JAGATDAL BRANCH—A meeting of the branch was held on 29-5-53 with Dr. S. C. Sarkar in the chair. Fifteen members were present. The members recorded its deep sense of sorrow at the sudden death of Dr. A. K. Sen, ex-Vice-President of I.M.A.

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A meeting of the branch was held on 11-6-53 with Dr. S. C. Sarkar in the chair. Thirty members attended. Dr. S. K. Ganguly, Superintendent, Kanchrapara T. B. Hospital spoke on "Recent Advances in the treatment of Tubercular Infection."

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A meeting of the branch was held on 27-8-53. A symposium on Pleurisy with effusion was arranged. Dr. S. K. Ganguly. Dr. B. Mukherjee and Dr. A. K. Dutta read their papers.

JALGAON BRANCH—A meeting of the branch was held on 27-4-53. Dr. K. W. Paradkar spoke on "Diphtheria."

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In a meeting of the branch held on 31-5-53. Dr. H. A. Maniar discussed the common skin and venereal diseases.

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A meeting of the branch was held on 21-6-53. Dr. S. S. Khalas gave a lecture on "Typhoid", and Dr. C. W. Joshi demonstrated two clinical cases of Dacrocystitis.

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At a meeting held on 27-6-53, the members accorded welcome to the Minister of Health and Labour, Bombay State and listened to his talk on Health and Medical Relief. Dr. N. V. Wardekar of Gandhi Memorial Leprosy Foundation, Wardha gave a talk on Leprosy.

KARIMNAGAR BRANCH—A meeting of the branch was held on 30-6-53 with Dr. Mir Mousik Uddin in the chair. Dr. Mir Mousik Uddin opened a symposium on "Epileptiform Convulsions." Next Dr. C. B. Reddy presented a case of Secondary Anaemia with Plummer Vinson Syndrome. Dr. R. Rao demonstrated 3 cases of T. B. lungs presenting 3 different types of pneumothorax.

KOTHAGUDIUM BRANCH—A meeting of the branch was held on 22-5-53 with Dr. T. C. Ramchandani in the chair. Dr. B. Das spoke on "School Health: its importance in nation building."

MADRAS BRANCH—A meeting of the executive committee of the branch was held on 28-5-53. Nine members were present. It was resolved to invite the 8th Provincial Conference, S. I. P. branch, and the annual provincial council meeting to Madras. Two new members were admitted. The suggested changes in the Rules were placed before the meeting and the report of the sub-committee was accepted in toto.

MADURA BRANCH—A meeting of the branch was held on 18-4-53 with Dr. A. S. Annamalai in the chair. Forty-six members were present. Dr. T. V. Venkatesan spoke on "Some Medical Emergencies in General Practice". This was followed by discussions by the members.

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A meeting was held on 23-5-53. Dr. A. S. Annamalai presided. The members discussed the circular of I.M.A. on "Medical aid to village by local branches of I.M.A." and formed a committee to examine the subject. Dr. B. Ramamurthi talked about the various causes in the intracranial and extracranial types of headache. He mentioned inter alia that the brain, the seat of all sensations is itself unable to feel any pain.

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A meeting of the branch was held on 20-6-53 with Dr. A. S. Annamalai in the chair. The secretary informed the members that the provincial conference had been invited to Madura during the Michaelmas holidays. Dr. C. P. Rayan gave a talk on "Treatment of Chronic Suppurative Otitis Media." Dr. Chellappa mentioned some of his impressions during his visit to the United Kingdom.

MALABAR BRANCH—A meeting of the branch was held on 14-6-53. Dr. V. G. Nair presented a few interesting dermatological cases and read a report on Rural Medical Relief.

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A meeting of the branch was held on 25-7-53. Dr. R. Janaki read a short paper on "Third Stage of Labour."

MANGALDAI BRANCH—A meeting was held on 21-6-53 with Dr. J. N. Chakraverty in the chair. Five doctors were present. The members decided not to invite the Provincial Conference to Mangaldai due to financial difficulties.

MORVI BRANCH—A meeting of the branch was held on 7-6-53. Thirteen members were present. Dr. J. G. Parekh presided. Dr. S. L. Munshi spoke on "Diagnosis of unconscious patient."

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A meeting of the branch was held on 16-8-53. Nine members were present. Dr. U. N. Mehta spoke on "Tongue as an Index to Diagnosis."

MUZAFFARPUR BRANCH—A meeting of the branch was held on 31-5-53. Dr. P. K. Ghosh read a scientific paper on "Conjunctivitis". Eight doctors were present.

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A meeting of the branch was held on 26-7-53. Dr. K. Nath read a paper on "Cataract, the mode of causation and its different types."

MYSORE PROVINCIAL BRANCH—The members of the provincial council met Drs. R. Nagendran, R. A. Rajan, V. B. Naidu, T. N. Srinivaseah and B. R. Rama Rao who were going abroad for Residency Training in American hospitals and Dr. S. C. Kuppanna who had returned after Residency training in America, at a pleasant function on 31-5-53.

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The 7th provincial council meeting was held on 31-5-53. Seventeen members were present. Dr. B. K. Narayana Rao was in the chair. Condolence resolutions were passed on the death of Dr. K. Narasimhamurthy, Dr. A. J. Ram and Dr. A. K. Sen, ex-Vice-President of I.M.A. The formation of a Public Liaison Committee by the Shimoga branch was appreciated. The secretary observed that the activities of most of the branches were confined only to clinical meetings and they failed to impress the public or the government. The members accepted the invitation of the Chikmagalur branch to hold the next annual conference. A sub-committee was formed to consider the revision of rules. Dr. B. R. R. Reddy explained the difficulties in starting the Employees' State Insurance Scheme in Bangalore and had made necessary recommendations to the government. The doctors of Coorg have been requested to form a branch in affiliation with the Mysore branch.

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A meeting of the Refresher Course Sub-committee of the branch was held on 17-4-53 with Dr. M. Sivaram in the chair. It was decided to hold the course for the year 1953 at Mysore under the auspices of the Mysore branch.

A meeting of the branch was held on 24-5-53 with Dr. J. S. Arthur in the chair. Twelve members were present. Dr. E. R. Menon spoke about "Treatment of Essential Hypertension."

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NAGAPATTINAM BRANCH—A meeting of the branch was held on 26-6-53 with Dr. J. S. Arthur in the chair. Twelve members were present. Dr. V. D. Rajan spoke on "Nutritional Deficiency Diseases."

NAWADAH BRANCH—A meeting of the branch was held on 28-6-53. Five members were present. Office-bearers for 1953-54 were elected with Dr. B. P. Gupta as president and Dr. J. N. Kabiraj as secretary. A clinical discussion was opened by Dr. B. P. Sur on the subject of "Some Observation on the various methods of treatment of Snake-bite."

NIZAMABAD BRANCH—A meeting of the branch was held on 5-6-53 with Dr. L. R. Despande in the chair. Dr. (Miss) D. Kamalam spoke on "Toxæmias of Pregnancy".

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A meeting of the branch was held on 18-7-53 with Dr. L. R. Despande in the chair. Dr. L. R. Lingam spoke on the "Common diseases of kidney and their treatment."

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A meeting of the branch was held on 5-8-53. Dr. A. V. Subha Rao spoke on "Diseases of Liver" and their treatment.

NOWGONG BRANCH—A meeting of the branch was held on 22-5-53 with Dr. H. K. Chaudhury in the chair. Six members were present. The meeting condoled the death of Dr. A. K. Sen. New office-bearers were elected with Dr. H. K. Chaudhury, as president and Dr. Upanada Saikia, secretary.

PORBANDAR BRANCH—A meeting of the branch was held on 21-6-53. Dr. H. H. Chavda presided. Nineteen members were present. Dr. K. W. Wahela read a paper on "Treatment of Acute Infectious Diseases in general and Typhoid Fever in particular."

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A meeting of the branch was held on 19-7-53. Twenty-four members were present. Dr. K. W. Wahela read a paper on "Coronary Thrombosis". Films of "Antihistamine Agents" and "Some aspects of muscle relaxants" were also shown to the members.

PUNJAB STATE BRANCH—In the meeting of the Provincial State Council, of the branch, held on 30-8-53, a scrutiny of the ballot papers was done and Dr. Sain Das Vohra was declared elected as president of the branch for the year 1953-54.

RAJPIPLA BRANCH—In a meeting of the branch, the members condoled the sad death of an active member of the branch Dr. B. V. Purohit on 29-5-53.

SHAHABAD BRANCH—A meeting of the branch was held on 7-6-53. Thirteen members were present. The attention of members was drawn to the mandatory provision of law for information to the proper authorities of all notifiable diseases. Condolence resolution on the sad death of Dr. A. K. Sen, ex-Vice-President of I.M.A. was passed. Interesting discussions were held on the interpretation of total and differential count of blood.

SHIMOGA BRANCH—A meeting of the branch was held on 4-7-53 with Dr. K. Srinivasa Rao in the chair. Dr. (Mrs.) Mathias demonstrated a specimen of advanced ectopic jestation. Dr. Krishnamoorthy demonstrated diagnosttic aids in the exclusion of leprosy and demonstrated a blood smear from a case of eosinophilic lung.

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A meeting of the branch was held on 8-8-53 with Dr. S. N. Setty in the chair. The meeting was well attended. Dr. Setty spoke on the pitfalls on the diagnosis and treatment of tuberculosis and narrated briefly the B.C.G. vaccination campaign in the State.

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SOUTH INDIAN PROVINCIAL BRANCH—A meeting of the Provincial Council was held on 28-3-53. Thirty-two members were present. Condolence resolutions on the death of the following members were passed: (1) Dr. R. Ramchandra Rao, (2) Dr. M. Sanjiva Rao, (3) Dr. G. P. Raghaviah, (4) Dr. P. S. Subramania Iyer, (5) Dr. K. K. P. Chidambaram, (6) Dr. P. Rathnaswamy. The rules of the Provincial Council as amended by the sub-committee were adopted. The report of the sub-committee regarding the honorary system in Madras State was adopted. The council requested the Government of Madras that in all committees which deal with health matters, there should be a representative of I.M.A. A sub-committee was formed to consider the proposal of panel system under the E.S.I.S. A resolution suggesting medical inspection of school children was adopted. The president's proposal to ask the local branches of the I.M.A. to render medical aid to one or two villages adjacent to the big towns by the members of the local branches, was accepted. The Council requested the Madras University to institute a new post-graduate degree in medicine called M.D. in general practice. The council requested the Government to extend the condensed M.B.B.S. course for some time more and not discontinue it as decided.

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The sub-committee of the council of the branch met on 12-4-53 to consider the panel system of rendering medical aid for insured people under the E. S. I. C. The sub-committee recommended to the Provincial Council and through the Provincial Council to the central I.M.A. that the capitation fee should be on the basis of at least 6 per cent sickness incidence among the workers and the medicines should be supplied by the Corporation.

A meeting of the Provincial Council was held on 30-6-53. Eighteen members were present. Resolutions condoling the death of the following members were passed: (1) A. K. Sen, Calcutta, (2) Major N. Gangadharan, Madras, (3) Dr. S. R. Madangopal Naidu, Madras, (4) Dr. P. Jabamani, Tinnevelly. The sub-committee's report on Employee's State Insurance Scheme and Panel System was adopted. The council decided to accept the invitation of the Madras Branch to hold the provincial medical conference in October this year at Madras. The council decided in favour of continuinng payment of T. A. to office-bearers only. The council sanctioned the excess expenditure incurred for 1951-52 and the statement of accounts for the 1st six months of 1952-53. The president was requested to draft suitable replies to the questionnaire from the Pharmaceutical Enquiry Committee. Re the railway concession to members attending the Annual Provincial Conference the Secretary was asked to forward the Council's resolution to the Dy. Minister for Railways, Government of India.

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A meeting of the Council of the branch held on 30-6-53, placed on record its deep sense of sorrow at the death of Dr. A. K. Sen of Calcutta.

TANJORE BRANCH—The 17th annual conference of the branch was held on 3-4-53. One hundred and twenty-five doctors were present. Dr. P. Arunachalam, the Director of Medical Services presided. Dr. P. Kutumbiah, Principal, Christian Medical College, Vellore, spoke on Rheumatic Heart Diseases and their Management. Dr. P. Arunachalam spoke on Adrenal Cortex in Health and Disease. This was followed by a lecture on Diseases of the Larynx. The president moved a condolence resolution on the death of Dr. P. Rathnasamy of Madras which was passed, all members standing.

TEJPUR BRANCH—A general meeting was held on 27-6-53 with Dr. H. C. Das in the chair. Fifteen members were present. The meeting condoled the sad death of Dr. Byomkesh Chakravorty a member of the Assam Medical Service. The Reception Committee for the 5th All-Assam Medical Conference was formed. Different Committee for the conference were also formed. The date of the conference would be finally settled later on. Regarding rejection of a proposed plot of land for the branch by Dy. Commissioner, Darrang, it was decided to make an appeal to the Revenue Minister and the Medical Minister of the Government of Assam.

TENALI BRANCH—A meeting of the branch was held on 30-5-53 with Major K. Vullakki in the chair. Capt. K. V. R. Chowdhury reviewed in detail the 19th Andhra Provincial Medical Conference. Dr. M. J. M. Rao showed a case of right-sided hypersecretion of perspiration and complete absence of it on the left, and also a case of tetanus in a girl of 15 years. Dr. B. N. Sastry reviewed the case of pleurisy which he demonstrated last month. Dr. K. Veerayya described further development of his empyema case. Capt. Imaduddin reviewed 3 cases of tumour of the thyroid gland which he operated within a course of 2 weeks.

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A meeting of the branch was held on 26-6-53 in connection with the 1st death anniversary of late Dr. A. Krishnamurthy.

The meeting continued under the presidentship of Dr. Krishnaih. Capt. M. Imaduddin demonstrated a case of Chorea and one of fœcal fistula due to amœbic infection of the transverse colon. A symposium on Filarial Infection was opened by Capt. M. Imaduddin and Capt. K. V. R. Choudari Dr. B. S. N. Sastry, Dr. M. Jaganmohanrao and Dr. Syed Latiff took part in it.

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A meeting of the branch was held on 25-7-53 with Major K. Vulakki in the chair. Dr. K. Veeraiah showed a case of Tremors of right hand and fingers. Capt. Imaduddin demonstrated for discussion, a woman patient aged 40 years with a Retrofaucial Tumour behind the right tonsil. Dr. K. Punnaiah showed a Lupus Erythematosis on the face. Dr. C. Krishnaiah described 3 cases (1) a case of perforated duodenal ulcer, (2) an infected ovarian cyst (3) volvulus of

small intestine. Dr. K. V. Sharma described a case hydatide form mole in 1st pregnancy and Major K. Vulakki described a case of advanced pregnancy with double mitral with aortic regurgitation.

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A meeting of the branch was held on 29-8-53 with Major K. Vulakki in the chair. At the outset the members condoled the sudden death of Dr. T. S. Tirumurti. Capt. Imaduddin demonstrated a case of Thomboangitis obleterans of right foot which was operated successfully in which a peri-arterial sympethectomy was done for right femoral artery in the Hunters canal. Next the symposium on modern therapy of Pulmonary Tuberculosis was opened by Dr. B. Pullaiah. Dr. B. S. Sastry, Capt. M. Imaduddin, Dr. P. V. Subbaiah, Capt. K. V. R. Chowdary took part in it. Dr. I. M. Sastry dealt with the Ayurvedic concept of treatment of Pulmonary Tuberculosis.

TINSUKIA BRANCH—A meeting of the branch was held on 7-6-53 with Dr. D. C. Chakrabarty in the chair. The half-yearly report was presented and passed. Accounts for 1950-51, 1951-52 were discussed and passed. The proposed amendment bill of I.M.C. Act was discussed. Dr. D. C. Chakrabarty spoke about some early symptoms and diagnosis of leprosy. Dr. H. G. Gupta spoke about treatment of bacillary dysentery with streptomycin orally or with chloromycetin or aureomycin in bad cases.

TIRUCHY BRANCH—A meeting of the branch was held on 23-5-53. Dr. T. S. Balasubramanyam presided. Fifty-five members were present. It was announced in the meeting that the Prithvi Insurance Company of Madras had agreed to give Rs. 1,000/- to the branch for doing free health check-up at the All-India Khadi Exhibition, Tiruchy. Dr. N. S. Narasima Iyer gave the members some interesting facts he learnt from the WHO tourists who visited Madras in April, 1953.

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A meeting of the branch was held on 20-6-53 with Dr. T. S. Balasubramanyam in the chair. Dr. K. S. Sanjivi spoke on "Chest Problems" which was greatly appreciated by the members.

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The foundation stone of the building of the branch was laid on 25-7-53. Fifty members were present. Dr. T. V. Srinivasam presided. The initiative for the building was taken about 20 years back at a meeting, when Dr. T. S. Tirumurti contributed Rs. 25/-. The function came to a close after a group photo was taken.

TIRUNELVELI BRANCH—A meeting of the branch was held on 6-4-53. Fifty members were present. A condolence resolution on the death of Dr. P. Jebamani was passed. Dr. M. V. Ramanamurthy, Dy. Director, Medical Services, Madras, gave a lecture on 'Fractures'.

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A meeting of the branch was held on 27-6-53. Thirty-two members were present. Dr. S. Chandrasekharan spoke on the "Treatment of Abscesses and Ulcers."

TRIVANDRUM BRANCH—A meeting of the branch was held on 8-7-53 to record its profound sense of sorrow at the sad and sudden death of Dr. P. S. Kuppuswamy.

ALL-INDIA MEDICAL CONFERENCE

The XXX All-India Medical Conference will be held on 26th, 27th and 28th December, 1953, in the Osmania University Campus at Hyderabad. Members of the Indian Medical Association intending to attend the forthcoming conference will be entitled to railway concessions (single fare for double journey). For railway concession forms and other details regarding the conference, the Provincial (or State) branch secretaries may kindly be contacted.

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SOUTH INDIAN PROVINCIAL MEDICAL CONFERENCE

The VIII South Indian Provincial Medical Conference will be held in the 1st week of November, 1953. An interesting Scientific Session and Practitioners' Quiz Medical exhibition will be organised on the occasion.

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UTTAR PRADESH MEDICAL CONFERENCE

The XVIII U. P. Medical Conference will be held at Gorakhpur on October 31st and November 1st, 1953. All information regarding the conference can be obtained from the Organising Secretary, U. P. Medical Conference, Main Bazar Gorakhpur.

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XIII BIHAR STATE MEDICAL CONFERENCE

The XIII Bihar State Medical Conferrence will be held on 29, 30 and 31st October 1953, at Jharia. The Scientific Session will be inaugurated by Dr. R. P. Sinha and presided over by Dr. Rajesari Prosad. It is expected that the general session will be inaugurated by Dr. Srikrishna Sinha, the Chief Minister of Bihar.

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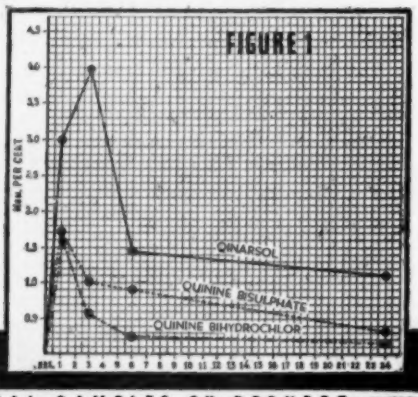

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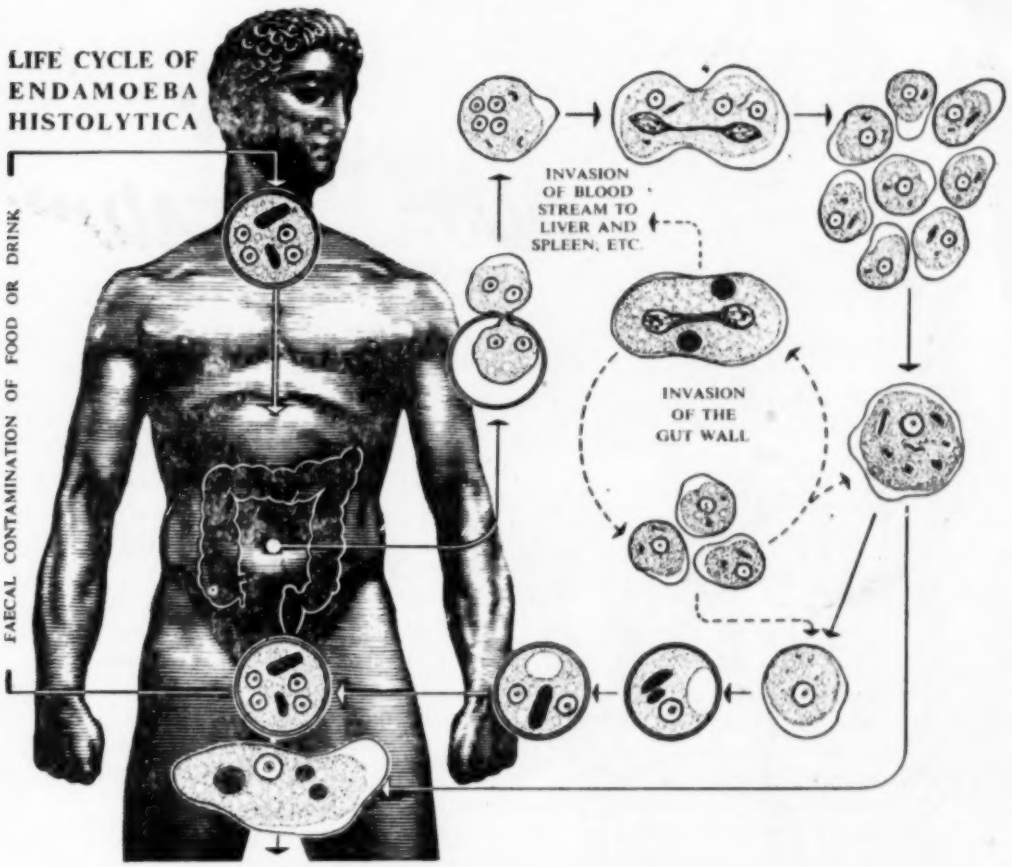

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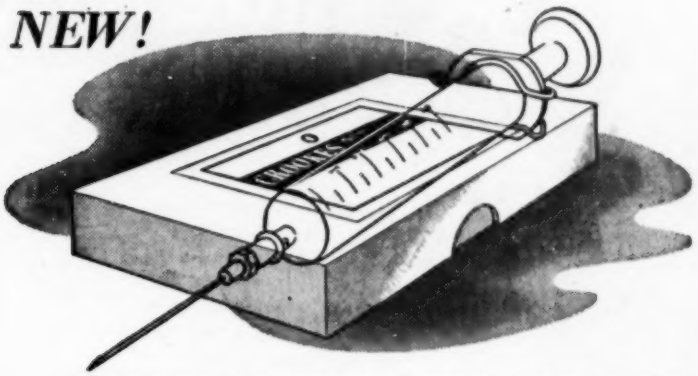

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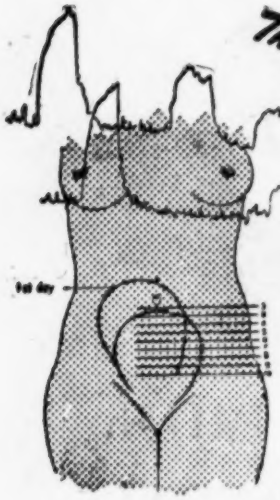

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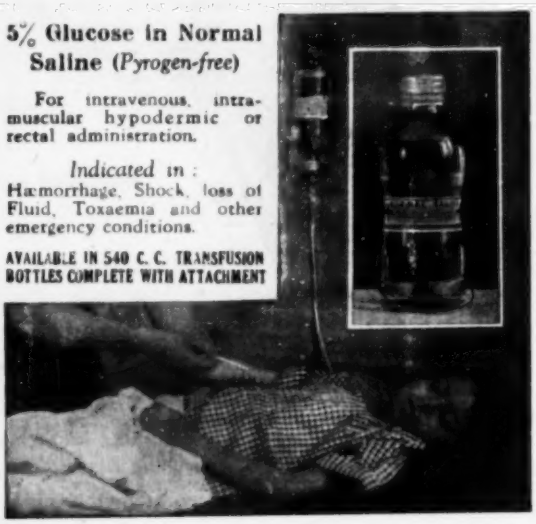

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